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# FOOD TECHNOLOGY ABSTRACTS



Central Food Technological Research Institute, Mysore  
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# FOOD TECHNOLOGY ABSTRACTS

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## ABBREVIATIONS

A	ampere	gr	gravity	qt	quart
AAS	atomic absorption spectrometry	gal	gallon	R	rontgen
ADP	adenosine diphosphate	gf	gram-force	rad	rad or radian
Anon.	Anonymous	GLC	gas-liquid chromatography	ref.	reference(s)
AOAC	Association of Official Analytical Chemists	h	hour	rev/min	revolutions per minute
approx.	approximately	ha	hectare	RH	relative humidity
atm	atmosphere	HDPE	high density polyethylene	RNA	ribonucleic acid(s)
ATP	adenosine triphosphate	hl	hectolitre [100 l]	S.	South, Southern, etc.
$a_w$	water activity	hp	horse power	s.d.	standard deviation
BHA	butylated hydroxyanisole	HPLC	high performance/pressure liquid chromatography	SDS	sodium dodecylsulphate
BHT	butylated hydroxytoluene	HTST	high temperature short time	s.e.	standard error
b.p.	boiling point	Hz	hertz [frequency cycles/s]	s	second [time]
Btu	British thermal unit	in	inch	SNF	solids-not-fat
c-	centi- [as in cm, cm <sup>2</sup> , cm <sup>3</sup> ]	IR	infrared	sp., spp.	species
cal	calorie	IU	international unit	sp.gr.	specific gravity
cd	candela	J	joule	summ.	summary
°C	degree centigrade	k-	kilo- [as in kcal, kg]	Suppl.	Supplement
Cl	curie	K	Kelvin	t	metric tonne
CMC	carboxymethyl cellulose	l	litre	temp.	temperature
coeff.	coefficient	lb	pound	TLC	thin layer chromatography
conc.	concentrated	lbf	pound-force	TS	total solids
concn.	concentration	LDPE	low density polyethylene	UHT	ultra-high temperature
cv.	cultivar	m-	milli- [as in mg, ml, mm]	UV	ultraviolet
cwt	hundredweight	m-	equivmilli-equivalent	V	volt
d-	deci-	M	molar concentration	var.	variety
DE	dextrose equivalent	M-	mega- [as in Mrad]	vol.	volume
detrn.	determination	max.	maximum	v/v	volume/volume
DFD	dark firm dry	min.	minute [time]	W	watt
diam.	diameter	min.	minimum	W.	West, Western, etc.
dil.	dilute	mol	mole	WHO	World Health Organization
DM	dry matter	mol.wt.	molecular weight	w/v	weight/volume
DNA	deoxyribonucleic acid(s)	m.p.	melting point	wk	week
dyn	dyne	MPN	most probable number	wt.	weight
E.	East, Eastern, etc	MS	mass-spectrometry	yd	yard
ECD.	electron capture detection	n-	nano- [10 <sup>-9</sup> , as in nm]	yr	year
EDTA	ethylenediaminetetraacetic acid	N	Newton [kg m/s <sup>2</sup> ]	μ	micro- [as in g, μm]
Eh	oxidation-reduction potential	N.	North, Northern, etc	%	per centum
ELISA	enzyme-linked immunosorbent assay	N	Normal concentration	>	greater than
f-	femto- [10 <sup>-15</sup> , as in fCl]	NMR	nuclear magnetic resonance	≥	greater than or equal to; not less than
°F	degree Fahrenheit	NPU	net protein utilization	<	less than
FAO	Food and Agricultural Organization	oz	ounce	≤	less than or equal to; not greater than
FDA	Food and Drug Administration	p-	pico- [10 <sup>-12</sup> , as in pCl]		
FID	flame ionization detection	P	Poise		
fl oz	fluid ounce	p	probability		
f.p.	freezing point	Pa	pascal (N/M <sup>2</sup> )		
ft	foot, feet	PAGE	polyacrylamide gel electrophoresis		
g	gram	PER	protein efficiency ratio		
GC	gas chromatography	p.p.b.	parts per billion		
		p.p.m.	parts per million		
		PSE	pale soft exudative		
		PTFE	polytetrafluorethylene		
		PVC	polyvinyl chloride		
		PVDC	polyvinylidene chloride		

## ABBREVIATIONS FOR LANGUAGES

### Language of text

Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	E
Swedish	Sv



393

Firmin (A). **Optimum conditions for cooking attieke.** *Tropical Science* 38(4); 1998; 220-223

# FOOD PACKAGING

394

Huber (M) and Franz (R). **Studies on contamination of post consumer plastics from controlled resources for recycling into food packaging applications.** *Deutsche Lebensmittel-Rundschau* 93(10); 1997; 328-331

Recycled materials reclaimed from controlled used food packaging material of the polymer types HDPE, PP, PS and PET were investigated with respect to their constituents. The study was designed as a comparison between virgin and recycled material to detect and identify recycling specific substances. As a general result, qualitatively and quantitatively, only a few contaminants were found. According to the intrinsic diffusivity of the investigated polymers, the impurification grade increased from PET to PS and to PP and HDPE. Most of the detected contaminants are aroma compounds and can therefore be linked with the foodstuffs contained in the package at the first usage. Furthermore, other contaminants like phthalates and paraffins were detected which are known as widespread impurifications. But they can have also entered the material by commingling with other polymers. In the odour test all recycling materials were identified because of their slight musty smell. For a direct food contact these materials would not be in compliance with the food laws. For an indirect use, e.g. buried by a virgin layer, the contamination risk of foodstuffs can be excluded applying the available knowledge of migration theory. In order to control the migration out of such materials at threshold-of-regulation concept is desirable, analogous to the corresponding FDA regulation. AA

395

Tawfik (MS), Devlieghere (F) and Huyghebaert (A). **Influence of D-limonene absorption on the physical properties of refillable PET.** *Food Chemistry* 61(1/2); 1998; 157-162

The absorption of D-limonene into polyethyleneterephthalate (PET) at different initial limonene concn. and storage temp. and the effect of this addition on the physical properties of PET were investigated. Strips of PET were immersed in model sol. (160 and 320 ppm limonene) for 45 days at 5, 22 and 37°C. The level of sorbed D-limonene and PET physical properties (tensile strength, modules of elasticity, and % elongation) were monitored as a function of time. Results indicated that the degree of absorption of D-limonene was dependent upon storage temp. and initial limonene concn. The majority of limonene was absorbed after 30 days at 22 and 37°C, but at 5°C, less absorption was observed. It was found that impact strength and modules of elasticity properties of PET were significantly affected with the level of absorption of D-limonene (at confidence level 0.05), while the elongation was not influenced. AA

396

Metois (P), Scholler (D), Bouquant (J) and Feigenbaum (A). **Alternative test methods to control the compliance of polyolefin food packaging materials with the European Union regulation: The case of aromatic antioxidants and of bis(ethanolamine) antistatics based on <sup>1</sup>H-NMR and UV-visible-spectrophotometry.** *Food Additives and Contaminants* 15(1); 1998; 100-111

A quick and easy analytical strategy to control the compliance of plastic packages in regard to European Union law for the migration of aromatic antioxidants and bis(ethanolamine) antistatics, is provided. The most efficient extraction method is the one using Soxhlet. The most suitable extraction solvent is dichloromethane. AA

397

Kleer (J), Sinell (H-J), Kuschfeld (D), Bartheloma (A), Bianchi (E), Ruschke (R). **Microbiological monitoring of aseptically packed semifluid foods with pH > 4.5 (low acid aseptic products).** *Deutsche Lebensmittel-Rundschau* 93(11); 1997; 360-367 (De)

Sauce a la Carbonara and Sauce Hollandaise serving as a model for low acid aseptic products were inoculated with *Salmonellae*, *Staphylococcus aureus*, *Clostridium sporogenes*, *C. perfringens* as well as with moulds and bacteria that were isolated from the air of an aseptic filling and packaging



chamber. Formation of blowers and growth of the inocula were registered. Following three wks. storage at 20-22°C, only a limited number of packs showed swelling and detectable organoleptic changes of the product itself whereas the rest of them always remained unaltered. Nevertheless, the pathogenic bacteria multiplied strongly, *S. aureus* despite of intense multiplication produced, no swelling at all. From the experimental conditions chosen here and for the products used in this study it can be concluded that total sampling is the only non destructive test of concern. The packages have to be held in quarantine for 3 wks. at 22°C or 5 wks. at 15°C resp., and may not be released unless each pack is inspected individually. AA

## FOOD ENGINEERING AND EQUIPMENT

398

Knorr (D), Schlueter (O) and Heinz (V). **Impact of high hydrostatic pressure on phase transitions of foods.** *Food Technology* 52(9); 1998; 42-45

The article discusses that understanding phase changes during pressure-assisted freezing and thawing of foods can aid food process and product development. CSA

399

Clark (JP). **Food engineering in practice.** *Food Australia* 50(8); 1998; 400-402

Some specific examples of practical food engineering are given. Retort pouch foods, computer control of breakfast cereal manufacture, hog fabrication, automated batching of dry mixes, blend-in-can, ice cream novelties are the aspects covered. SRA.

400

Linko (S). **Advanced and intelligent control of food processes.** *Food Australia* 50(8); 1998; 407-411

This paper discusses the potential of some novel tools in food process control. Aspects included are, PID, PLC, DSC, SCADA and PC (food process control, personal computers in the factory, advanced model-based control, fuzzy knowledge-based control and expert systems, food industry

applications, neural control and what can we expect of the future. SRA.

401

Datta (AK). **Computer-aided engineering in food process and product design.** *Food Technology* 52(10); 1998; 44-52

This article primarily relates to computational fluid dynamics which covers a large number of food product and process designs. Some examples of food processing applications of other computer-aided engineering software are also included. CSA

## ENERGY IN FOOD PROCESSING

Nil

## FOOD CHEMISTRY AND ANALYSIS

### Chemistry

402

Lammert (AM), Schmidt (SJ) and Day (GA). **Water activity and solubility of trehalose.** *Food Chemistry* 61(1/2); 1998; 139-144

The  $a_w$ , moisture sorption isotherm, and solubility of trehalose were determined. The  $a_w$  of a saturated sol. of trehalose, as measured by an electric hygrometer, was 0.98 and 0.97 at 20 and 25°C, resp. The  $a_w$  was also measured by a Decagon  $a_w$  instrument and found to be 0.96 and 0.95 at 20 and 25°C, resp. The moisture sorption isotherm of trehalose at 20°C was found to be a Type III isotherm. Trehalose solubility from 10-40°C was determined using a two step method. The solubility of trehalose in water at 10, 20, 30 and 40°C was found to be 42.3, 46.6, 52.3 and 59.7% (g trehalose 100 g<sup>-1</sup> sol.), resp. AA

403

Musaiger (AO), Ahmed (MA) and Rao (MV). **Chemical composition of some traditional dishes of Oman.** *Food Chemistry* 61(1/2); 1998; 17-22



Proximate, mineral, fatty acid and cholesterol compositions of 20 dishes consumed in Oman were analysed. Protein level ranged from 0.4 to 7.6%, while the fat content ranged between 0.3 and 28.1%. The dishes were found to be poor in Fe, Zn and Ca. Except for three dishes which had Na levels less than 70 mg/100 g, the Na ranged from 108 to 571 mg/100 g. Two dishes were high in cholesterol (69.3 and 32.7 mg/100 g), while the cholesterol level ranged from 0.0 to 9.64 mg/100 g. The fatty acid analysis showed that palmitic, oleic and linoleic acids were predominant. In general, the chemical compositions of Omani dishes are similar to those of other Arabian Gulf countries. The present information can be used as a baseline for establishing food composition data for Oman. AA

404

Miyake (N), Kim (M) and Kurata (T). **Formation mechanism of monodehydro-L-ascorbic acid and superoxide anion in the autoxidation of L-ascorbic acid.** *Bioscience, Biotechnology and Biochemistry* 61(10); 1997; 1693-1695

The oxidation of L-ascorbic acid (ASA) by mol. oxygen was studied in the absence of heavy metal ion catalyst. The formation of superoxide anion was confirmed during the autoxidation of ASA not only in aqueous sol. but also in MeOH. The formation mechanism of superoxide anion was discussed based on both experimental and mol. orbital (MO) calculation results. It was proposed that ASA autoxidation proceeded via the C(2) oxygen adduct of ASA, and superoxide anion would be directly released from the C(2) oxygen adduct of ASA, forming monodehydro-ASA (MDASA). AA

405

Liu (MH) and Chen (BH). **Relationship between chlorophyll a and  $\beta$ -carotene in a lipid-containing model system during heating.** *Food Chemistry* 61(1/2); 1998; 41-47

The relationship between chlorophyll a (Chl a) and  $\beta$ -carotene during heating in the presence of fatty acid esters, methyl stearate, methyl oleate and methyl linoleate, was studied. Mixtures of Chl a,  $\beta$ -carotene and fatty acid esters were heated at 60°C and 120°C for varied lengths of time. Isomerization and degradation reactions of Chl a and  $\beta$ -carotene were monitored using HPLC with diode array detection. Three isomers of Chl a and 4 cis-isomers of  $\beta$ -carotene were detected. Both the degradations

of total amounts of Chl a and  $\beta$ -carotene during heating fit the first-order model. The degradation rates of total amounts of Chl a and  $\beta$ -carotene were highest in methyl stearate, followed by in methyl oleate and methyl linoleate. In the presence of fatty acid esters Chl a is more susceptible to isomerization and degradation than  $\beta$ -carotene during heating. AA

406

Newsome (WH), Davies (DJ) and Sun (WF). **Residues of polychlorinated biphenyls (PCB) in fatty foods of the Canadian diet.** *Food Additives and Contaminants* 15(1); 1998; 19-29

Market basket samples representative of food from 6 Canadian cities were surveyed from 1992 to 1996. Fifty composites of fatty foods, prepared for consumption were analysed for 40 PCB congeners by GC-MS. Fish and butter contained the highest total PCB concn., while milk and infant foods contained the lowest. The dairy and meat composites were major contributors to the total PCB intake of 5.7 ng/kg/day, and to the TEQ (2,3,7,8-tetrachloro-p-dibenzodioxin equivalent) intake of 0.11 pg/kg/day. The pattern of congeners was similar for the different food groups with the exception of fish, which contained less tri- and tetra-chlorinated biphenyls and more of the hexachlorinated congener No. 153. AA

407

Nakayama (T), Hashimoto (M) and Hashimoto (K). **Superoxide dismutase inhibition of oxidation of ubiquinol and concomitant formation of hydrogen peroxide.** *Bioscience, Biotechnology and Biochemistry* 61(12); 1997; 2034-2038

Ubiquinone (CoQ<sub>0</sub>) and H<sub>2</sub>O<sub>2</sub> formed in the process of oxidation of ubiquinol (CoQ<sub>0</sub>H<sub>2</sub>) was measured. Cu-Zn superoxide dismutase and Mn superoxide dismutase inhibited both the CoQ<sub>0</sub> formation and the H<sub>2</sub>O<sub>2</sub> formation only in the presence of chelators such as DTPA (diethylenetriaminepentaacetic acid). The amount of H<sub>2</sub>O<sub>2</sub> was almost equal to that of CoQ<sub>0</sub>, indicating that the H<sub>2</sub>O<sub>2</sub> formation was coupled with the CoQ<sub>0</sub> formation. The lack of inhibitory effects of the corresponding heat-inactivated superoxide dismutase (SOD) confirmed that the inhibition by the original SOD was due to its enzymatic activity. CoQ<sub>0</sub>H<sub>2</sub> oxidation occurs as a chain reaction with superoxide as the



chain carrier and that SOD inhibits this reaction by lowering the superoxide concn. AA

408

Miyake (N), Otsuka (Y) and Kurata (T). **Autoxidation reaction mechanism for L-ascorbic acid in methanol without metal ion catalysis.** *Bioscience, Biotechnology and Biochemistry* 61(12); 1997; 2069-2075

The autoxidation reaction of L-ascorbic acid (ASA) in methanol without metal ion catalysis was studied. Besides L-threonolactone (THL) and oxalic acid (OXA), methyl L-threonate, and threonic acid were identified as initial autoxidation products of ASA, which were the C(2)-C(3) fission product via the C(2) oxygen adduct of ASA. This pathway is different from the one via dehydro-L-ASA (DASA), which has long been believed to be the only oxidation pathway of ASA. It was confirmed that this reaction also occurred in both water and other polar solvents, including methanol. It was clarified that mono-dissociated ASA was more reactive than the non-dissociated ASA in this pathway, and that the main reaction products formed from these two forms of ASA were also somewhat different. Detn. of the amount of remaining ASA and the yields of THL and OXA, C(2)-C(3) fission products, and of DASA were carried out during the autoxidation of ASA under various reaction conditions. AA

409

Nara (E), Miyashita (K) and Ota (T). **Oxidative stability of liposomes prepared from soybean PC, chicken egg PC, and salmon egg PC.** *Bioscience, Biotechnology and Biochemistry* 61(10); 1997; 1736-1738

The oxidative stability (OS) of phosphatidylcholines (PCs) from soybean, chicken egg, and salmon egg in liposomes was compared with that in aqueous micelles. When each PC was oxidized in aqueous micelles, salmon egg PC was the most oxidatively stable, followed by chicken egg PC and soybean PC, however, no significant difference in the OS was apparent between chicken egg PC and salmon egg PC in liposomes. The main mol. sp. of soybean PC was 1,2-dilinoleoyl-PC, while most of the PUFAs in chicken egg PC and salmon egg PC were not esterified at the sn-1 position but at the sn-2 position. It is suggested that the OS of PC liposomes would be strongly influenced by the positional distribution of PUFAs in the PC molecule. Further studies on the

oxidation of PC liposomes showed that chicken egg albumin and soybean protein protected PC bilayers against attack by free radicals generated in the aqueous phase. AA

## Chemistry (Analytical)

410

Roubtsova (S), Hollander (J) and Franz (R). **A rapid and convenient method for the quantitative determination of bisphenol A diglycidyl ether (BADGE) in foodstuffs.** *Deutsche Lebensmittel-Rundschau* 93(9); 1997; 273-276

411

Nerin (C), Batlle (R) and Cacho (J). **Design of a test for migration studies in the vapour phase.** *Food Additives and Contaminants* 15(1); 1998; 84-92

A migration test is designed in the vapour phase in which Tenax is used as solid adsorbent. Supercritical fluid chromatography is applied to the Tenax after the migration test, and analysed by GC-ECD. The best experimental conditions recommended for the migration test from a plastic film to a vapour phase are 7 days at 80°C. GS

412

Hemmerling (C) and Seidl (G). **Rapid determination of ethephon residues in food with head space gas-chromatography.** *Deutsche Lebensmittel-Rundschau* 93(8); 1997; 239-242 (De)

413

Anklam (E), Lipp (M), Radovic (B), Chiavaro (E) and Palla (G). **Characterisation of Italian vinegar by pyrolysis-mass spectrometry and a sensor device ('electronic nose').** *Food Chemistry* 61(1/2); 1998; 243-248

Industrially made vinegar 'Aceto Balsamico di Modena' and traditionally produced vinegar 'Aceto Balsamico Tradizionale di Modena e di Reggio Emilia' were analysed by means of pyrolysis-mass spectrometry (Py-MS) and a sensor technique ('electronic nose'). Both methods allow a fast classification (typically about 5 min). While the 'electronic nose' is analysing the volatile compounds of the samples simultaneously with 32 sensors, Py-MS applies thermal decomposition of the samples, subsequently analysing the pyrolysate with a mass spectrometer. Both techniques were



demonstrated to be capable of discriminating between the 2 groups of vinegar. Although the number of samples available for this study did not seem to be sufficient for detailed analysis, both methods indicated possible discrimination of the samples within the group of 'Aceto Balsamico Tradizionale di Modena' regarding the age of the sample. AA

414

Divakar (S). **Nuclear magnetic resonance spectroscopy in food applications: A critical appraisal.** *Journal of Food Science and Technology (India)* 35(6); 1998; 469-481

Usefulness of Nuclear Magnetic Resonance (NMR) spectroscopy in food applications is presented in this review. Some of the basic concepts of NMR pertaining to one-dimensional and two-dimensional techniques, solid-state NMR and Magnetic Resonance Imaging (MRI) are discussed. Food applications dealt with encompass such diverse areas like nature and state of water in foods, detection and quantitation of important constituents of foods, intact food systems and NMR related to food biology. AA

415

Vasundhara (TS), Kumudavally (KV), Jayathilakan (K) and Jeyashakila (R). **HPLC analysis of the biogenic amines in some processed foods of Indian origin.** *Journal of Food Science and Technology (India)* 35(6); 1998; 551-556

Cheese, fermented cereal-legume batters (Idli and Dosa), chocolates, fermented vegetables, sprouted legume, wine, curd and processed meat and fish products were analysed by HPLC to determine the polyamine composition. Most of the foods contained some polyamine or the other. The concn. of individual amine showed wide variations between different categories of food. Within the same category, mostly quantitative differences were noticed. Processed ripened cheese contained moderate to high concn. of tyramine and small amounts of histamine, putrescine and cadaverine. Fresh cheese showed very small concn. of all amines. In fermented cereal legume batters, putrescine, cadaverine and tyramine were found to be the important amines. When the proportion of dhal (legume) was more, higher quantities of amines were observed. In these products, origin of amines could be traced to legume only and under normal

fermentation conditions, moderate concn. of different amines were found. Chocolates showed small concn. of putrescine, cadaverine, histamine and tyramine. In processed meat and fish products, putrescine, cadaverine, histamine spermine and spermidine in small concn. were detected. In these products, amines were found to be more useful as quality indicators. AA

416

Beil (D), Moller (M), Paschke (A), Steinhart (H) and Ring (J). **Detection and determination of pesticide residues by HPLC and GC.** *Deutsche Lebensmittel-Rundschau* 93(8); 1997; 242-247 (De)

417

Cooper (I), Goodson (A) and O'Brien (A). **Specific migration testing with alternative fatty food simulants.** *Food Additives and Contaminants* 15(1); 1998; 72-78

Specific migration data obtained using olive oil, is compared with alternative fat simulants iso-octane and 95% ethanols, to find out if similar results are obtained and to identify the most appropriate alternative simulant to use for future testing. Good agreement with the olive oil migration data was obtained using 95% ethanol for both of the additives studied in polyolefins. The specific migration limits (SMLs) for the two additives will not be exceeded for the polystyrene materials. GS

418

Hadrich (J). **Quality assurance guideline: Validation of analytical Methods. Part II. Practical example.** *Deutsche Lebensmittel-Rundschau* 93(9); 1997; 282-284 (De)

419

Dubey (JK) and Stan (H-J). **Second-derivative UV-spectroscopic determination of dithiocarbamate residues as methyl xanthate in apple and lamb's lettuce.** *Journal of Food Science and Technology (India)* 35(6); 1998; 482-485

The residue analysis of dithiocarbamate fungicide was carried out by using second derivative UV spectroscopic detn. as methyl xanthate based on hot acid decomposition, scrubbing the released CS<sub>2</sub> with Cu-(II)-acetate and conc. sulphuric acid and absorbing CS<sub>2</sub> in methanolic potassium hydroxide. The absorbance of xanthate system and height of



the negative peak at 302 nm (second derivative method) were used to quantitate the CS<sub>2</sub>. The derivative procedure was more selective and sensitive to CS<sub>2</sub> than the classical method. The coeff. of variation for the detn. (n=10) of 0.20 µg/ml standard of CS<sub>2</sub> was 2.6%. The detection limit for CS<sub>2</sub> was 0.07 µg/ml. The procedure was adopted for residue analysis of thiram on apple and lamb's lettuce. AA

## FOOD MICROBIOLOGY AND HYGIENE

### Microorganisms

#### Bacteria

420

Solaiman (DKY) and Somkuti (GA). **Construction of a green-fluorescent protein-based, insertion-inactivation shuttle vector for lactic acid bacteria and *Escherichia coli*.** *Biotechnology Letters* 19(12); 1997; 1175-1179

A shuttle vector, p5aGFP2201a, for lactic acid bacteria and *E. coli* was constructed by using the gene of a jellyfish green fluorescent protein (*gfp*) as a selection marker. The plasmid was shown to function as a shuttle vector by its ability to carry and express a staphylococcal chloramphenicol acetyltransferase (*cat*) gene into targeted hosts. AA

#### *Bacillus subtilis*

421

Ogawa (Y), Yamaguchi (F), Yuasa (K) and Tahara (Y). **Efficient production of  $\gamma$ -polyglutamic acid by *Bacillus subtilis* (natto) in jar fermenters.** *Bioscience, Biotechnology and Biochemistry* 61(10); 1997; 1684-1687

The large scale fermentation of  $\gamma$ -polyglutamic acid ( $\gamma$ -PGA) by *Bacillus subtilis* (natto) was done using a 30-liter jar fermenter. A stable cultivation without foaming could be done with addition of 3% NaCl to the medium. The  $\gamma$ -PGA productivity became higher with increasing speed of agitation and amounts of glutamic acid added to the broth. Finally, it was able to obtain about 35 mg/ml of  $\gamma$ -PGA under the optimum conditions. The glutamic acid added to the medium was efficiently converted into  $\gamma$ -PGA in the stationary phase. To discover the role of L-glutamic

acid added to the medium for  $\gamma$ -PGA biosynthesis by *Bacillus subtilis* (natto), the radioactivity incorporated into  $\gamma$ -PGA from <sup>14</sup>C-L-glutamic acid was measured. As a result, radioactive  $\gamma$ -PGA was detected in the medium. Then, the glutamic acid in the medium was transported into the cells and actually polymerized as the glutamic acid unit of  $\gamma$ -PGA. AA

#### Bacterium

#### Agrobacterium

422

Lee (JW), Yeomans (WG), Allen (AL), Gross (RA) and Kaplan (DL). **Microbial production of water-soluble non curdian type exopolymer-B with controlled composition by *Agrobacterium* sp.** *Biotechnology Letters* 19(12); 1997; 1217-1221

The cell growth, production of exopolymers, and the molar ratio of glucose to mannose in the water-soluble non curdian type exopolymer-B (WSNCE-B), which is one of three exopolymers purified from the culture of *Agrobacterium* sp., varied with carbon source, culture medium, and initial medium pH. The molar percentage of rhamnose, a minor component in WSNCE-B, varied up to 13%, dependent on physiological conditions. No rhamnose was found in the WSNCE-B purified from the culture with initial medium pH greater than or equal to 6.8. The relative amount of mannose in WSNCE-B increased regularly with the amount of yeast extract added to the mineral salts medium. The relative amounts of glucose, mannose, and rhamnose in the WSNCE-B can be controlled by varying culture conditions. AA

#### Fungi

#### Mushroom

423

Yildiz (A), Karakaplan (M) and Aydin (F). **Studies on *Pleurotus ostreatus* (Jacq. ex Fr.) Kum. var. *salignus* (Pers. ex Fr.) Konr. et Maubl.: Cultivation, proximate composition, organic and mineral composition of carpophores.** *Food Chemistry* 61(1/2); 1998; 127-130

This study was conducted on the growth and cultivation of *Pleurotus ostreatus* var. *salignus* on



local cellulosic wastes. The highest and lowest yields for 100 g material (70% moisture) were obtained with peanut straw (24.8 g) and with sorghum straw (11.3 g), resp. Protein, pilus/stip, sporophore wt., % dry material, N and C in highest amounts were obtained with peanut straw. The lowest mushroom wt. and pilus/stip ratio were obtained with sorghum, whereas the lowest protein, N and dry material wt. were obtained with wheat straw. In all the *P. ostreatus* var. *salignus* cultivated on peanut and sorghum straw, the most abundant nutrients were protein, K and C. These results are discussed in relation to the prospect of cultivating *P. ostreatus* var. *salignus* in Diyarbakir, Turkey. AA

424

Ahlatwat (OP). **Effects of bacterial inoculants on mycelial growth, pinning yield and quality of white button mushroom (*Agaricus biporus*).** *Journal of Scientific and Industrial Research* 57(10,11); 1998; 686-691

## Hygiene

425

Byrne (M). **Food safety - from stable to stable.** *Food Engineering International* 23(1); 1998; 51-55

The article discusses that preventive measures such as HACCP, the use of preservatives and effective sterilizing techniques must be linked with microbiological testing and cleanliness monitoring to prevent food contamination. CSA

426

Untermann (F). **The HACCP-system: Part II. Important aspects for the realization of the HACCP-system into practice.** *Deutsche Lebensmittel-Rundschau* 93(10); 1997; 307-311 (De)

427

Untermann (F). **The HACCP-system: Part 1. The HACCP system defined by Codex Alimentarius.** *Deutsche Lebensmittel-Rundschau* 93(9); 1997; 277-281 (De)

428

Untermann (F) and Hartig (M). **The HACCP-system: Part IV. Integration of the HACCP-system of Codex Alimentarius into internal company control according to  $\delta$  4 LMHV.**

*Deutsche Lebensmittel-Rundschau* 93(12); 1997; 375-378 (De)

The basic agreement between  $\delta$  4 of the Food Hygiene Directive (LMHV) and the HACCP system of Codex Alimentarius is first of all based on the fact that a specific hazard analysis constitutes the point of departure for preventive measures. Hence,  $\delta$  4 LMHV and Codex Alimentarius share the feature of an in-process control which is based on a specific hazard analysis. However, in contrast to the more detailed HACCP principles the requirements in  $\delta$  4 LMHV which regulate the "establishment and performance of effective safety measures and their monitoring for those critical points" can be applied to all sectors of the food production. The undefined legal notion "effective safety measures" implies the possibility to call e.g. for a documentation or for the application of the entire HACCP system in case this constitutes the only way to ensure sufficiently effective safety measures for certain production processes. AA

429

Unterman (F), Dura (U) and Stephan (R). **The HACCP-systems: Part 3. Description of the most common mistakes.** *Deutsche Lebensmittel-Rundschau* 93(11); 1997; 341-347 (De)

The most common mistakes which can be encountered in the conception of HACCP systems are portrayed with the help of examples from practice. A lack of expertise concerning the pathogenesis and epidemiology of foodborne infections and intoxications in humans are the decisive cause of mistakes. The necessity of the consequential application of HACCP principles and that of a clear structure of defined measures are being explained. It is not uncommon to find extensive concepts which do not sufficiently meet food safety objectives. It is recommended to have concepts of companies analyzed and checked for efficiency, including economic efficiency, by a food safety expert with expertise in the pathogenesis and epidemiology of foodborne infections and intoxications. AA

## BIOTECHNOLOGY

430

Arcos (JA), Bernabe (M) and Otero (C). **Quantitative enzymatic production of**



Selective production of emulsifiers from glucose and fatty acids has been achieved using an immobilized *Candida antarctica* lipase. Optimization of process selectivity considers the solubilities of the sugar and its monoesters in acetone at different temp. the percentage of this organic solvent in the reaction mixture, and the reaction temp. The solvent (acetone) is both easily eliminated and accepted by the European Community for use in the manufacture of foods and/or food additives. Different fatty acids with a longer length chain than that of caprylic acid may be employed. For saturated fatty acids longer than lauric acid, continuous precipitation of the monoester as it is formed at 40°C permits nearly complete conversion (98%) of glucose to the monoester within 2-3 days. The procedure does not require total dissolution of the sugar, and precipitation of the monoester permits selective conversion of charges of glucose higher than 100 mg/mL solvent. A scaleup of the process under the optimum conditions gives high yields of 6-O-lauroyl glucose, which may be readily prepared on a gram scale. AA

431

Misra (SCK), Archana (S), Subhas Chandra, Kumar (N) and Sethi (VC). **Development of sensors for food processing.** *Journal of Scientific and Industrial Research* 57(12); 1998; 897-902

Certain polymeric materials exhibit high sensitivity to microbial species. The sensing devices for detection of microbial species are fabricated from polymer thin films and have quick response and high sensitivity towards microbial species normally encountered in food processing and are cost-effective. These sensors can be used for online monitoring of the food processing chain and positioned remotely to provide an audio-video alarm. AA

432

Khedkar (JN), Dave (JM) and Sannabhadti (SS). **Antibacterial activity associated with *Bifidobacterium adolescentis*.** *Journal of Food Science and Technology (India)* 35(6); 1998; 527-529

Three strains of *Bifidobacterium adolescentis* (Hb1, Tub-12D, Nub-3D) were isolated and compared for their antibacterial activity with *Bifidobacterium*

*bifidum*. The bifidobacteria were grown in skim milk for 24, 48 and 72 h. The cell-free filtrate was examined for antibacterial activity against *Escherichia coli*, *Shigella sonnei*, *Staphylococcus aureus*, *Bacillus cereus*, *Salmonella typhosa* and *Pseudomonas aeruginosa* by well assay technique. The max. inhibitory effect was elaborated at 48 h of incubation. Methanol-Acetone-Extract (MAE) from Hb1 strain exhibited max. inhibitory effect followed by Nub-3D and Tub-12D. The strain of *Bifidobacterium bifidum* showed moderate influence. The MAE was pale yellow in colour with an oily consistency and positive to ninhydrin and Molisch's reaction. The antibacterial principle in MAE was heat stable and active between pH 3.8 and 4.8. AA

433

Faus (I), Patino (C), del Rio (JL), del Moral (C), Barroso (HS), Blade (J), Rubio (V). **Expression of a synthetic gene encoding the sweet-tasting protein thaumatin in the filamentous fungus *Penicillium roquefortii*.** *Biotechnology Letters* 19(12); 1997; 1185-1191

A synthetic gene encoding the amino acid sequence of the sweet-tasting protein thaumatin II has been expressed in *Penicillium roquefortii*. Using several different expression cassettes thaumatin was expressed either intracellularly or extracellularly, at concn. of 1-2 mg thaumatin/l. AA

## TISSUE CULTURE

Nil

## FOOD ADDITIVES

### Antioxidants

434

Unno (T), Sakane (I), Masumizu (T), Kohno (M) and Kakuda (T). **Antioxidative activity of water extracts of *Lagerstroemia speciosa* leaves.** *Bioscience, Biotechnology and Biochemistry* 61(10); 1997; 1772-1774

In order to develop naturally occurring antioxidants from edible plants, the antioxidative effect of hot water extracts of *Lagerstroemia speciosa* leaves,



known by the Tagalog name of *banaba* in the Phillipines, was studied. The content of tannin in *banaba* extract was 36.8% in dry wt. *Banaba* extract showed strong antioxidative activity in a linoleic acid autoxidation system. *Banaba* extract was found to have a potent radical scavenging action on 1,1-diphenyl-2-picrylhydrazyl (DPPH) radicals and superoxide radicals ( $O_2^{\cdot-}$ ) generated by a hypoxanthine (HPX)/xanthine oxidase (XOD) system. *In vitro* lipid peroxidation of rat liver homogenate induced by tert-butyl hydroperoxide (BHP) was inhibited by the addition of *banaba* extract in a dose-dependent manner. From these results, *banaba* extract was demonstrated to be useful as an antioxidant or free radical scavenger to protect biological systems against oxidative stress. AA

435

Yen (G-C) and Hsieh (C-L). **Antioxidant effects of dopamine and related compounds.** *Bioscience, Biotechnology and Biochemistry* 61(10); 1997; 1646-1649

The antioxidant and free radical scavenging effects of dopamine, noradrenaline, tyramine, and tyrosine were investigated and compared with  $\alpha$ -tocopherol. The antioxidant effect of dopamine and its related compounds on peroxidation of linoleic acid were in the order of dopamine >  $\alpha$ -tocopherol = tyramine > tyrosine > noradrenaline as measured by the thiocyanate method. These amine compounds had reducing power, and a scavenging effect on reactive oxygen sp., i.e., superoxide anion and hydroxyl radical. The results for reducing power and scavenging effect of these amine compounds had a similar trend as their inhibition of linoleic acid peroxidation. The antioxidant activity of these amine compounds in soybean oil was also evaluated by the Rancimat method. The induction time to reach 100 meq/kg peroxide value (POV) of soybean oil for dopamine,  $\alpha$ -tocopherol, tyramine, tyrosine, noradrenaline, and control were 9.0, 8.2, 8.0, 6.4, 4.6, and 4.3 h, resp. The antioxidant efficacy of amine compounds seems to be correlated with the numbers of hydroxy groups and their position on the phenolic ring. AA

436

Duan (S), Weng (XC), Dong (XW), Liu (YP), Li (HP), Jin (JR). **Antioxidant properties of butylatedhydroxytoluene refluxed in ferric chloride solution.** *Food Chemistry* 61(1/2); 1998; 101-105

1,2-Bis (3,5-di-tert-butyl-4-hydroxyphenyl)-ethane (BBHPE), 3,3',5,5'-tetra-tert-butyl-stilbene-4,4'-quinone (TBSQ), 3,3',5,5'-tetra-tert-butylhydroxystilbene-4,4'-quinone (TBHSQ) and 4-hydroxy-3,5-tert-butylbenzaldehyde (HBBA) were isolated from a mixture of butylatedhydroxytoluene (BHT) refluxed in ferric chloride sol. by using TLC and identified by mass, NMR, IR and UV spectra. Their antioxidant properties were investigated individually and in comparison with BHT and BHA on the Oxidative Stability Instrument (OSI) at 95, 100 and 105°C, separately. This demonstrated that BBHPE was the strongest antioxidant of the compounds isolated, much stronger even than BHT and as strong as BHA. The phenolic compound, HBBA, structurally similar to BHT, had much weaker antioxidant effect than BHT and even weaker than the quinones, TBSQ and TBHSQ. The strength of the antioxidant activity of the compounds decreased in the order: BHA, BBHPE > BHT > TBSQ, TBHSQ > HBBA. As temp. increased, the protection factors (Pf) of BHA and BHT increased, but those of BBHPE, TBSQ, TBHSQ and HBBA decreased slightly. AA

437

Demertzis (PG) and Franz (R). **A systematic study on the stability of selected polymer antioxidants in EU official aqueous and alternative food simulants using HPLC.** *Food Additives and Contaminants* 15(1); 1998; 93-99

The stability of five selected commercial plastic additives (Irganox 3114, Irganox 1035, Irganox 245, Irganox 1098 and Irgafos P-EPR) were analysed in three European Union (EU)-official aqueous food simulants (distilled water, 3% aqueous acetic acid and 15% aqueous ethanol) and in an alternative fat simulant (95% aqueous ethanol) under the different time/temp. exposure conditions (10 days at 40°C and 1 h at 100°C). A simple and rapid HPLC method with UV detection was developed. All the additives except Irganox-type additives were stable under the applied exposure conditions in all of the employed food simulants. GS

## Flavourings

438

Newberne (P), Smith (RL), Doull (J), Goodman (JI), Munro (IC), Portoghese (PS), Wagner (BM), Weil (CS), Woods (LA), Adams (TB), Hallagan (JB), Ford (RA). **GRAS flavouring substances 18.** *Food Technology* 52(9); 1998; 65-66, 68, 70, 72, 74, 76



The 18th publication by the Flavour and Extract Manufacturer's Association's Expert Panel on recent progress in the consideration of flavouring ingredients generally recognized as safe under the Food Additives Amendment is discussed. CSA

## Preservatives

439

Grewal (JS), Tiwari (RP) and Singh (G). **Effect of nutrition on antimicrobial activity of selected preservatives.** *Journal of Food Science and Technology (India)* 35(6); 1998; 486-492

Antimicrobial activities of selected food preservatives were examined in synthetic and complex growth medium against food isolates. Antimicrobial activity as determined by test organism growth inhibition was found to vary with the concn. of agents used, growth medium, test organism and the addition of agents either alone or in combination. In general, these agents caused growth inhibition at low concn. (100-200 ppm), when these were added to synthetic growth medium or used in combination with other antimicrobial agents. AA

## Stabilizers

### Gum

440

Janaki (B) and Sashidhar (RB). **Physico-chemical analysis of gum kondagogu (*Cochlospermum gossypium*): A potential food additive.** *Food Chemistry* 61(1/2); 1998; 231-236

The physico-chemical characteristics of gum kondagogu (*Cochlospermum gossypium*) were examined for the first time. The gum was compared with conventionally used food grade gum karaya (*Sterculia* sp.). Chemical analyses revealed that gum kondagogu had higher soluble fibre, protein, tannin, Ca and K contents than karaya gum. Gum kondagogu also differs from gum karaya in terms of its intrinsic viscosity, water binding capacity and pH. The basic constituent sugars were similar to that of gum karaya but the proportions of the individual sugars varied. Gum kondagogu had a higher uronic acid (glucuronic and galacturonic acid, 63%) content than neutral sugars (arabinose, rhamnose and galactose, 37%), which could lead to significant

differences in the utility and functionality of the gum. AA

## Sweetener

441

Ebeling (SC). **The synthesis of artificial sweeteners (phenylglycine-analogues of aspartame) in order to evaluate changes in the  $\gamma$ -glycophore component.** *Food Chemistry* 61(1/2); 1998; 107-112

## CEREALS

442

Haddad (Y), Benet (JC) and Abecassis (J). **A rapid, general method for appraising the rheological properties of the starchy endosperm of cereal grains.** *Cereal Chemistry* 75(5); 1998; 673-676

A rapid, simple method was developed to prepare small, parallel-epipedal test samples of endosperm of wheat, corn, and rice grains. Compression tests performed on endosperm samples revealed the following mechanical properties: modulus of elasticity (E, GPa), breaking stress ( $\sigma_{rup}$ , MPa), and max. breaking strain ( $\epsilon_{rup}$ , %). All tests were performed on several endosperm test samples of each cereal sp. The results displayed good repeatability and several significant differences in the mechanical behaviour of different endosperm structures, especially among soft, hard, and durum wheats. Rice and corn endosperm displayed mechanical behaviour similar to that of durum wheat endosperm. The method proposed appears to be sufficiently sensitive and repeatable for studying the incidence of hardness and vitreousness of cereal grain endosperm in relation to its suitability for milling. AA

443

Kubomura (K). **Instant noodles in Japan.** *Cereal Foods World* 43(4); 1998; 194-197

Different types of noodles, processing of instant noodles (mixing, rolling, cutting, steaming, heating, flavouring, molding and dehydration), soup manufacture, ingredients (flour, starch, water, salt, kansui, other ingredients and fortification), noodle texture and nutritional characteristics are the various aspects covered in this article. CSA



444

Shamekh (S), Mustranta (A), Poutanen (K) and Forssell (P). **Enzymatic hydrolysis of barley starch lipids.** *Cereal Chemistry* 75(5); 1998; 624-628

The efficiency of phospholipase and lipase preparations in the hydrolysis of lysophospholipids of native and gelatinized barley starch was examined. The degree of hydrolysis was analyzed by detn. of the amount of released fatty acids by an enzymatic method. Thermal and structural properties of the enzyme-treated starch were studied by differential scanning calorimetry and light microscopy. Lysophospholipids of the gelatinized barley starch were easily hydrolyzed, in contrast to the lipids of the granular starch. The max. degree of hydrolysis achieved for the gelatinized starch was 80% and for the native starch approx. equal to 20%. Gelatinization enthalpies and micrographs indicated that even though the amount of the released fatty acids from the native starch was small, formation of free fatty acids inhibited swelling and gelatinization of starch granules. AA

445

Klamczynski (A), Baik (B-K) and Czuchajowska (Z). **Composition, microstructure, water imbibition, and thermal properties of abraded barley.** *Cereal Chemistry* 75(5); 1998; 677-685

446

Kalra (S) and Jood (S). **Biological evaluation of protein quality of barley.** *Food Chemistry* 61(1/2); 1998; 35-39

Protein quality of barley cvs., namely BH-331 (hulled), DL-88 (hullless) and Dolma (hullless) having 2.18, 4.60 and 6.23%  $\beta$ -glucan content, resp., was biologically evaluated by rat growth and nitrogen balance studies. Feeding of BH-331 barley diet resulted in marked decrease of food intake, body wt. gain, food efficiency ratio, protein efficiency ratio, nitrogen absorption, biological value net protein utilization and utilizable protein. The diet containing Dolma cv. (hullless and high  $\beta$ -glucan) caused by intermediate effect on all the protein quality parameters. DL-88 (hullless) gave better results than BH-331 and Dolma. Therefore,  $\beta$ -glucan content may not be affecting protein quality parameters in barley. However, hulled barley

(BH-331) showed adverse effects on biological parameters in which husk seems to contribute towards unpalatability of the diet, thereby leading to a reduced food intake and other related parameters AA

447

Kaukovirta-Norja (A), Reinikainen (P), Olkku (J) and Laakso (S). **Influence of barley and malt storage on lipoxygenase reaction.** *Cereal Chemistry* 75(5); 1998; 742-746

The dioxygenation of linoleic acid (LA) by aqueous flour suspensions of barley and malting samples was studied. The rate of this lipoxygenase (LOX) reaction varied as the malting process proceeded, giving a characteristic LOX reaction profile for a malting. The differences in the profiles from one malting to another were dramatic. It also appeared that during storage of dry, intact kernel samples from a single malting, a reduction in the rate of LOX reaction always occurred, and the rates of reduction with time were dependent on the stage of malting at the time of sampling. The kinetics of this aging could roughly be divided into 4 categories representing different stages of malting. Consequently, greatly varying LOX reaction profiles can be obtained from a single malting depending on the time of storage of kernels before assays. The results indicate that steeping, germination and the subsequent drying render the state of kernels unstable with respect to the LOX reaction for at least 2 to 3 wks. Homogeneity of malt quality is important in the further applications of malt, especially in the brewing industry. Therefore, the rate of LOX reaction should be considered as a quality factor of malt. AA

448

Czuchajowska (Z), Klamczynski (A), Paszczynska (B) and Baik (B-K). **Structure and functionality of barley starches.** *Cereal Chemistry* 75(5); 1998; 747-754

449

del Moral (LFG), Sopena (A), Montoya (JL), Polo (P), Voltas (J), Codesal (P), Ramos (JM), Molina-Cano (JL). **Image analysis of grain and chemical composition of the barley plant as predictors of malting quality in Mediterranean environments.** *Cereal Chemistry* 75(5); 1997; 755-761



450

Manisha Guha and Ali (SZ). **Parboiling of brown rice: Effect of variety and parboiling conditions.** *Journal of Food Science and Technology (India)* 35(6); 1998; 504-508

Suitability of dry-heat (roasting) parboiling process for brown (dehusked) rice of two fine and two coarse var. was studied. While the fine grain var. got parboiled to a mild degree, by roasting in hot sand (1:4) at 180°C to 200°C for 1.75 to 2.75 min, the coarse var., having white-belly, could not be fully parboiled. The parboiled rice produced by this treatment required less time to cook than normal steam-parboiled rice. Steaming of brown rice for 30 to 40 min under mild (0.5 kg/cm<sup>2</sup>) pressure after soaking for 1 h and tempering for about 5 h (room temp.) produced fully parboiled rice from both fine and coarse var. Cooking properties of this mildly pressure-parboiled brown rice were very close to those exhibited by normal steam-parboiled rice. AA

451

Meullenet (J-FC), Gross (J), Marks (BP) and Daniels (M). **Sensory descriptive texture analyses of cooked rice and its correlation to instrumental parameters using an extrusion cell.** *Cereal Chemistry* 75(5); 1998; 714-720

Sensory characteristics of cooked rice texture for 3 cvs were evaluated using both descriptive sensory methods and an instrumental extrusion cell. Nine sensory textural characteristics were evaluated and 5 instrumental parameters were used to establish predictive models for the sensory characteristics evaluated. Multiple regression models with  $R^2$  ranging from 0.22 to 0.70 were obtained for 7 of 9 sensory attributes studied. Sensory characteristics most effectively predicted were hardness ( $R^2 = 0.62$ ) and toothpack ( $R^2 = 0.70$ ). Predictive models of textural sensory characteristics of cooked rice were also evaluated using partial least square regression techniques. Best results were obtained for hardness (relative ability of prediction [RAP] = 0.52), cohesiveness of mass (RAP = 0.60), toothpull (RAP = 0.73), and toothpack (RAP = 0.54). AA

452

Reid (JD), Siebenmorgen (TJ) and Mauromoustakos (A). **Factors affecting the slope**

**of head rice yield vs. degree of milling.** *Cereal Chemistry* 75(5); 1998; 738-741

Milling data of 4 long-grain rice cvs. were analyzed to determine the uniformity in the slope of their curves for head rice yield (HRY) vs. the corresponding degree of milling (DOM). The data set for each cv. comprised samples that had been subjected to various drying air conditions and durations and milled over a range of moisture contents. All treatment combinations were split and milled for either 15, 30, 45, or 60 sec in a McGill No. 2 laboratory mill to obtain HRY vs. DOM data. Linear relationships between HRY and DOM, as observed in past research, were confirmed. This implies that as rice is milled to greater extents (higher DOM), the HRY decreases linearly. Within the bounds of the experimental levels tested, neither the drying air condition nor drying duration affected the rate at which HRY changed with DOM. However, the cv. and the moisture content at which the rice was milled significantly ( $P < 0.05$ ) influenced this rate. At higher milling moisture contents, the decrease in HRY per unit of increase in the DOM was greater than at lower moisture contents. While not conclusive, there was an indication of a relationship between the av. kernel thickness of a cv. and the HRY vs. DOM slope. AA

453

Siebenmorgen (TJ). **Influence of postharvest processing on rice quality.** *Cereal Foods World* 43(4); 1998; 200-202

Application of systematic approach to view the rice postharvest area as a system, particularly with the overall constraint that "quality" in its many definitions and interpretations, must be preserved through all operations is discussed. CSA

454

Ohtsubo (K), Toyoshima (H) and Okadome (H). **Quality assay of rice using traditional and novel tools.** *Cereal Foods World* 43(4); 1998; 203-206

Starch analysis (amylose content and gelatinization test), physical properties of cooked rice grains, detection of change in rice qualities during storage, sensory test and physico-chemical evaluation of the palatability of rice and identification of rice cvs. are the aspects discussed. CSA



Juliano (BO). **Varietal impact on rice quality.** *Cereal Foods World* 43(4); 1998; 207-211, 214-216, 218-222

Identification of the varietal impact on rice by classifying rice by specific quality type, source and specific var. is discussed. CSA

## Wheat

456

Raeker (MO), Gaines (CS), Finney (PL) and Donelson (T). **Granule size distribution and chemical composition of starches from 12 soft wheat cultivars.** *Cereal Chemistry* 75(5); 1998; 721-728

457

Wieser (H), Antes (S) and Seilmeier (W). **Quantitative determination of gluten protein types in wheat flour by reversed-phase high-performance liquid chromatography.** *Cereal Chemistry* 75(5); 1998; 644-650

A combined extraction-HPLC procedure was developed on a microscale to determine the amounts of the different gluten protein types ( $\omega$ 5- $\omega$ 1,2-,  $\alpha$ - and  $\gamma$ -gliadins; high mol. wt. [HMW] and low mol. wt. [LMW] glutenin subunits) in wheat flour. After preextraction of albumins and globulins from flour (100 mg) with a salt sol. (2 x 1.0 mL), extraction of gliadins was achieved with 60% aqueous ethanol (3 x 0.5 mL). Subsequently, the glutenin subunits were extracted under nitrogen and at 60°C with 50% aqueous 1-propanol containing Tris-HCl (0.05 mol/L, pH 7.5), urea (2 mol/L) and dithioerythritol (1%). The separation and quantitative detn. of gliadins and glutenin subunits was then performed by reversed-phase HPLC on C<sub>8</sub> silica gel at 50°C using a gradient of increasing acetonitrile concn. in the presence of 0.1% trifluoro-acetic acid. The flow rate was 1.0 mL/min, and the detection wavelength was 210 nm. Temp. and flow rate were modified for the quantitation of single underivatized HMW subunits. To determine the absolute amounts of protein types, different protein standards (gliadin, LMW and HMW subunits, bovine serum albumin) with known protein contents were compared to HPLC absorbance areas. The calibration curves were almost identical and linear over a broad range (20-220  $\mu$ g). This extraction-HPLC procedure allows

an accurate, reproducible, sensitive, and relatively fast quantitative detn. of all gluten protein types in wheat flour, and can be applied to quality evaluation of cereals as raw materials or in processed products. AA

458

Grant (LA). **Effects of starch isolation, drying and grinding techniques on its gelatinization and retrogradation properties.** *Cereal Chemistry* 75(5); 1998; 590-594

The effects of 2 different methods of starch isolation, drying, and grinding on gelatinization and retrogradation properties were investigated. Starch was isolated from whole wheat and flour of 4 hard red spring wheat cvs. portions of each starch isolate were freeze-dried or air-dried and portions of each dried starch were ground using a mortar and pestle or a Wiley Jr. Mill. Less starch damage was obtained for freeze-dried starch regardless of isolation method or grinding technique and for all starches derived from whole wheat. Highest starch damage was obtained for air-dried starch isolates. Wiley-milled starch isolates showed higher water-binding. Whole wheat starch isolates had higher peak, lower trough, and lower final viscosities, as determined by starch paste viscosity analysis, than did starch isolates derived from flour. Major effects of all treatments on differential scanning calorimetry gelatinization properties showed lower onset temp. for flour starch isolates, lower peak temp. for freeze-dried starches, and no effects due to grinding. Endotherms of all starches after refrigerated storage and freeze-thaw cycling were lower than those for gelatinization. AA

459

Bergman (CJ), Gualberto (DG), Campbell (KG), Sorrells (ME) and Finney (PL). **Genotype and environment effects on wheat quality traits in a population derived from a soft by hard cross.** *Cereal Chemistry* 75(5); 1998; 729-737

460

Kiribuchi-Otobe (C), Yanagisawa (T), Yamaguchi (I) and Yoshida (H). **Wheat mutant with waxy starch showing stable hot paste viscosity.** *Cereal Chemistry* 75(5); 1998; 671-672



Lee (S-A) and Lim (S-T). **Preparation and solubility of phosphorylated  $\beta$ -cyclodextrins.** *Cereal Chemistry* 75(5); 1998; 690-694

## Corn

461

Barrett (AH) and Kaletunc (G). **Quantitative description of fracturability changes in puffed corn extrudates affected by sorption of low levels of moisture.** *Cereal Chemistry* 75(5); 1998; 695-698

Fracturability is a defining textural characteristic of extruded and crunchy products such as puffed snacks and cereals. Even low levels of moisture can significantly affect deformation properties and texture due to changes in the distribution of fracture intensities. The fracturability of puffed corn extrudates produced at two specific mechanical energy (SME) levels, which greatly influenced extrudate structure and deformation behaviour, was measured by compression testing before and after equilibration of samples at 33% RH. Significant changes in fracturability due to moderate moisture sorption were manifest in a reduced total number of fractures occurring during compression, an indication of plasticization that was confirmed independently by differential scanning calorimetry (DSC) studies as reductions in glass transition temp. ( $T_g$ ). However, in both instances, mean fracture intensity and av. compressive resistance increased after equilibration, indicating a qualitative toughening or hardening of the products, despite increased moisture and decreased  $T_g$ . These textural developments were also reflected in changes in the parameters of fitted fracture intensity distributions. Thus, the influence of processing conditions (quantified in terms of SME) on the creation of new micro and macrostructures, and the effect of low levels of moisture on these structures, can be identified by using fracturability characteristics and  $T_g$ . Furthermore, fracturability parameters can demonstrate complexity in the deformation patterns of products that thermal measurements confirm to be plasticized. AA

462

Krieger (KM), Pollak (LM), Brumm (TJ) and White (PJ). **Effects of pollination method and growing location on starch thermal properties of corn hybrids.** *Cereal Chemistry* 75(5); 1998; 656-659

$\beta$ -Cyclodextrin (CD) was phosphorylated with phosphoryl chloride in aqueous alkaline media at different temp. and pH values. The phosphorylated cyclodextrin (PCD) were characterized by P contents and positions of substitution as determined by  $^{31}\text{P}$ -NMR spectroscopy. Reaction of CD with equimolar  $\text{POCl}_3$  for 3 h at pH 12 and  $45^\circ\text{C}$  yielded in a PCD with a P content of 5.67%. The ratio of mono- and diphosphate esters increased when the reaction temp. was raised from 25 to  $60^\circ\text{C}$ . The monoesterified phosphate groups were mainly located at C-6 of the anhydroglucose units when the reaction pH was 11 or 12. Reactions at pH 10, however, led to a higher degree of substitution at C-2 than at C-6. Phosphorylation enhanced the water solubility of CD. Solubility of a PCD (5.65% P) was 35% at pH 8 and  $25^\circ\text{C}$ . Simultaneously, solubility of the PCD in 25% ethanol in water was much greater than unsubstituted CD (22.3 vs. 2.8%). The PCD enhanced the water solubility of nonpolar compounds, such as  $\beta$ -carotene. AA

464

Zhang (W) and Hoseneey (RC). **Factors affecting expansion of corn meals with poor and good expansion properties.** *Cereal Chemistry* 75(5); 1998; 639-643

Two corn meals, one with good and one with poor expansion properties, were used to study the critical factors responsible for poor expansion during corn curl extrusion. Screening tests revealed that the corn meal with poor expansion had a slightly larger particle size. This sample also had a larger proportion of opaque particles compared to the corn meal with good expansion. Extrusion of coarse corn grits showed that larger particle size alone could cause poor expansion. Water diffusion tests showed that the sample containing more opaque particles was more competitive for water. As a result, in corn that contained both opaque and vitreous particles less water was available to the vitreous particles. The underplastisized (dry) vitreous particles remained glassy (unmelted) during extrusion, resulting in reduced expansion of the extrudates. The results suggest that addition of water to the conditioning cylinder of the extruder would overcome poor expansion. AA



Marks (BP) and Stroshine (L). **Relating electrolyte leakage to shelled corn storability.** *Cereal Chemistry* 75(5); 1998; 651-655

Corn from 3 growing seasons was harvested, dried, and stored in small bins. Samples taken at harvest and after various periods of bin storage (up to 77 months) were evaluated by two primary tests: carbon dioxide evolution during accelerated storage at approx. equal to 20.5% moisture content and 26°C and electrolyte from bulk (100 g) samples soaking in deionized water. The initial ( $t < 72$  h) slope of carbon dioxide evolution rate curves (SLOPE72) was used as a base measure of storability (i.e., potential for safe storage without significant mold invasion). In electrolyte leakage tests, both test temp. and initial sample moisture content influenced results. Additionally, water conductivity after 10 min was correlated ( $r = 0.79$ ) with SLOPE72, implying that electrolyte leakage has the potential to provide rapid information regarding future storability. AA

## Sorghum

466

McDonough (CM), Anderson (BJ), Acosta-Zuleta (H) and Rooney (LW). **Steam flaking characteristics of sorghum hybrids and lines with differing endosperm characteristics.** *Cereal Chemistry* 75(5); 1998; 634-638

Commercial and food-type sorghum hybrids with differing kernel and endosperm characteristics were grown under comparable conditions and steam flaked in each of three yrs. The raw-grain kernel characteristics and proximate analyses were homogenous over the three-yr. period. The waxy hybrid produced large, translucent, durable flakes that had significantly higher enzyme-susceptible starch values for all yrs. compared to the other var. Flakes with lower amylose contents (waxy endosperm) were positively correlated with percent whole flakes ( $r^2 = 0.509$ ), flake dia. ( $r^2 = 0.846$ ), and enzyme-susceptible starches ( $r^2 = 0.564$ ) and negatively correlated with higher flake fragility ( $r^2 = -0.647$ ), test wt. ( $r^2 = -0.626$ ), and flake breakage ( $r^2 = -0.560$ ). The heterowaxy flakes had a good appearance and were generally comparable in quality to the nonwaxy commercial and experimental hybrids. Heterowaxy sorghum hybrids with good grain yields can provide improved quality grain and flakes without sacrificing agronomic performance

and yields. No difference in flaking performance was detectable among the kernels with different pericarp colors; flakes from the white food-type sorghums had excellent appearance. Nontempered control samples were inferior in quality to all conditioned treatments. AA

467

Weaver (CA), Hamaker (BR) and Axtell (JD). **Discovery of grain sorghum germ plasm with high uncooked and cooked *in vitro* protein digestibilities.** *Cereal Chemistry* 75(5); 1998; 665-670

Grain sorghum has been documented to have low protein digestibility (PD) relative to other cereal grains. Low PD of sorghum is most pronounced in cooked foods and is ranked slightly lower than corn as a feed grain. In this article, sorghum germ plasm is identified that has substantially higher uncooked and cooked flour *in vitro* PD than normal cvs. Sorghum lines were found within a high-lysine population derived from the mutant P721Q that have approx. equal to 10-15% higher uncooked and approx. equal to 25% higher cooked protein digestibilities using a pepsin assay. Highly digestible sorghum grain showed little reduction in digestibility after cooking, compared to the large reduction that is typical of normal sorghum cvs. Using the three-enzyme pH-stat method, it showed that the highly digestible lines had the same degree of peptide bond hydrolysis in approx. equal to 5 min, as was found in 60 min in the normal cv., P721N. Differences in PD were related to enzyme susceptibility of the major storage prolamin,  $\alpha$ -kafirin, that comprises approx. equal to 50-60% of the total sorghum grain protein. Using the enzyme-linked immunosorbent assay (ELISA) technique to track the pepsin digestion of  $\alpha$ -kafirin, the highly digestible lines had approx. equal to 90-95%  $\alpha$ -kafirin digested in 60 min compared to 45-60% for two normal cvs.  $\gamma$ -Kafirin, a minor structural prolamin found mainly at the periphery of protein bodies, was also somewhat more digestible in the highly digestible sorghums. Highly digestible grain was of a floury kernel type, though recently this trait has been found in a modified background. More digestible protein from sorghum grain, that additionally is high in lysine content and has a fairly hard endosperm, could be of important benefit to populations who lack adequate protein in their diets, and may, pending further studies, prove to increase the value of sorghum as a feed grain. AA



Mahgoub (SEO) and Elhag (SA). **Effect of milling, soaking, malting, heat-treatment and fermentation on phytate level of four Sudanese sorghum cultivars.** *Food Chemistry* 61(1/2); 1998; 77-80

Four cvs. of Sudanese sorghum (*Sorghum bicolor*) were analysed for their phytate content, with respect to effects of processing operations, namely milling extraction, water soaking, malting, heat-treatment and fermentation. The conditions of processing used were decortication to give an 80% extraction meal; 12 and 24 h soaking in tap water; 96 h germination; fermentation for 3, 6, 9 and 12 h; and cooking at 95°C until starch gelatinized. Total phosphorus, phytate phosphorus and phytic acid were determined. Results showed that phytic acid phosphorus formed > 85% of total phosphorus of the sorghum cvs. studied. All treatments investigated caused phytic acid reduction to various extents. Enzymic methods of phytic acid removal (fermentation and malting) were found to be more effective than physical extraction methods, i.e. milling, soaking and heating. AA

469

Zhang (G) and Hamaker (BR). **Low  $\alpha$ -amylase starch digestibility of cooked sorghum flours and the effect of protein.** *Cereal Chemistry* 75(5); 1998; 710-713

The comparably low starch digestibility (SD) of cooked sorghum flours was studied with reference to normal maize. Four sorghum cvs. that represent different types of endosperm were used. Starch digestibilities of 4% cooked sorghum flour suspensions, measured as reducing sugars liberated following  $\alpha$ -amylase digestion, were 15-25% lower than for cooked maize flour, but there were no differences among the cooked pure starches. After the flours were predigested with pepsin to remove some proteins, the SD of cooked sorghum flours increased 7-14%, while there was only 2% increase in normal maize; however, there was no effect of pepsin treatment on SD if the flours were first cooked and then digested. After cooking with reducing agent, 100 mM sodium metabisulphite, SD of sorghum flours increased significantly while no significant effect was observed for maize. Also, starch solubility of sorghum flours at 85 and 100°C was lower than in maize, and sodium metabisulphite increased solubility much more in sorghum than in maize. Differential scanning

calorimetry results of the flour residue after  $\alpha$ -amylase digestion did not show any peaks over a temp. range of 20-120°C, indicating that sorghum starches had all undergone gelatinization. These findings indicate that the protein in cooked sorghum flour pastes plays an important role in making a slowly digesting starch. AA

## PULSES

### Bean

470

Lombardi-Boccia (G), Lucarini (M), Lullo (GD), Puppo (ED), Ferrari (A), Carnovale (E). **Dialysable, soluble and fermentable calcium from beans (*Phaseolus vulgaris* L.) as model for *in vitro* assessment of the potential calcium availability.** *Food Chemistry* 61(1/2); 1998; 167-171

Calcium potential availability from mottled and white bean was studied by using an *in vitro* model which simulates the conditions existing in the small intestine and the fermentation process in the colon. Beans contained high amounts of Ca which distribution in the seed varied greatly (hull 70%, cotyledon 30%). The percentage of Ca dialysability in both bean var. was in the range of 14%. Dehulling greatly improved Ca dialysability; when compared to whole seed, increases of up to 97% ( $P < 0.01$ ) were found. Ca dialysability from the hull was very low (4-8%). Dialysable Ca and soluble Ca were not affected by cooking. Results indicated that phytate was not the main inhibitor of Ca dialysability from beans. The overall Ca dialysability from beans was mainly influenced by the Ca status in the hull. Ca released from retentate (from 24 to 72%), during *in vitro* fermentation experiments indicated a substantial degradation of the undialysable high mol. wt. (HMW) Ca complexes within the 14 h of the fermentation process. AA

### Chickpea

471

Singh (U) and Lakshmi Iyer. **Dehulling of chickpea (*Cicer arietinum* L.): A comparative study on laboratory mills, pre-treatments and genotypes.** *Journal of Food Science and Technology (India)* 35(6); 1998; 499-503



The laboratory mills and pre-treatments for dehulling of chickpea genotypes were compared. The Satake laboratory mill followed by AGT mill was found suitable for this purpose. The ICARDA mill not only produced high percentages of brokens and powder fraction but also produced less reliable results on dhal yield of chickpea genotypes. Pre-treatment employing soaking of seeds in sodium bicarbonate or NaCl sol. significantly improved the yield of dehulled product, dhal. The genotype and pre-treatment were found to exert a great influence on the dehulling characteristics of chickpea. AA

### Common bean

472

Giada (MDLR), Miranda (MTM) and Marquez (UML). **Sulphur  $\gamma$ -glutamyl peptides in mature seeds common beans (*Phaseolus vulgaris* L.).** *Food Chemistry* 61(1/2); 1998; 177-184

The non-protein fractions of 5 common bean var. (*Phaseolus vulgaris* L.) have been studied in order to determine their total contents of  $\gamma$ -glutamyl-S-methyl-L-cysteine ( $\gamma$ -Glu-Cys(S-Me)) and of free S-methyl-L-cysteine (S-Me-L-Cys). After isolation by extraction with 70% ethanol and purification by ion-exchange chromatography on cationic and anionic supports, the identification of these compounds was achieved by amino acid analysis after HCl hydrolysis and by mass spectrometry.  $\gamma$ -Glu-Cys(S-Me) was present in high levels in all the var. studied: the av. content was 11  $\mu\text{mol g}^{-1}$  seed wt., accounting for approx. 50% of the bean methionine content determined by ion-exchange chromatography. Free S-Me-L-Cys constituted up to 20% of the total amount of S-Me-L-cys found. The presence of  $\gamma$ -glutamyl-L-methionine did not seem to interfere in the total methionine content since its concn. in the non-protein bean fractions studied was negligible. These results suggest (1) that the presence of  $\gamma$ -glutamyl-S-Me-L-cys in whole beans may overestimate the methionine content up to 50%, when this is determined by the traditional method of cyanogen bromide cleavage followed by gas chromatographic analysis of the resulting methyl thiocyanate; (2) a routine quantification method for these sulphur compounds in beans on a laboratory scale is now possible. AA

### Green bean

473

Vazquez-Blanco (ME), Vazquez-Oderiz (ML), Simal-Lozano (J) and Lopez-Hernandez (J). **Determination of mineral elements in Galician green beans by atomic spectroscopy.** *Deutsche Lebensmittel-Rundschau* 93(9); 1997; 286-287

### Mash bean

474

Neerja Rani and Hira (CK). **Effect of different treatments on chemical constituents of mash beans (*Vigna mungo*).** *Journal of Food Science and Technology (India)* 35(6); 1998; 540-542

Mash beans (*Vigna mungo*) were subjected to different treatments as follows: One set was pressure-cooked for 30 min at 15 lbs. psi., the second set was roasted in sand at 250°C, the third set was sprouted for 36 h at 40°C and the fourth set was dehulled. One part was kept raw. Pressure-cooked and sprouted samples were dried at 60 plus or minus 2°C. All samples were ground to fine powder and analysed for proximate principles, available lysine, tryptophan and cystine contents. The crude proteins ranged between 19.37-20.72 g/100 g. The sprouted samples had significantly ( $P < 0.05$ ) lower Ca, ionisable Fe and Mn, while pressure-cooked samples had min. values of P and Fe. Methionine and cystine contents of raw mash beans were 1.30 and 1.15 g/16 gN, resp. Pressure-cooking significantly reduced methionine content but cystine was not affected by any treatment. Max. loss of available lysine was observed on roasting ( $P < 0.05$ ), followed by pressure-cooking and sprouting. Among various treatments, pressure cooking and dehulling were found to be the best to destroy antinutritional factors in mash beans. AA

### Yambean

475

Agunbiade (SO). **The chemical composition and *in vitro* digestibility of yambean starch.** *Food Chemistry* 61(1/2); 1998; 173-176

The chemical composition and *in vitro* digestibility of starch extracted from yambean, *Sphenostylis stenocarpa*, were determined. The white, powdery



starch was fibre-free and was characterized by low crude N, lipid and ash values but very high polysaccharide (N-free extract), 98.37%. Yambean starch (YBS) amylose was 34%. The reducing sugar yield from its acid digestion was 103 mg 100 mg<sup>-1</sup> sample. Only 20.8% of 1% gelatinized YBS was reduced to reducing sugars by 1% salivary amylose extract in 80 min when the achromic stage was attained using a qualitative iodine test. Except for Mg, Ca and Fe ions, the mineral content of yambean starch was very low. AA

## OILSEEDS AND NUTS

### Soybeans

476

Vanaja (M) and Swarajya Lakshmi. **Effect of graded levels of nitrogen and phosphorus on yield, oil and protein contents of soybean (*Glycine max* (L) Merrill).** *Andhra Agricultural Journal* 45(1/2); 1998; 28-30

### Soy products

477

Gopi (C). **Soybean lecithin: Its manufacture, properties and applications.** *Indian Food Industry* 17(4); 1998; 224-234

Definition of lecithin, typical composition of soybean, structural formula of lecithin, its physical properties, solubility and stability of lecithin, classification of phosphatides, chemical properties, commercial grades of lecithin, analysis and test methods for technical evaluation of commercial lecithin, health and safety factor, uses of lecithin in animal feeds, baking products and mixes, candy, cheese slabs, chewing gum, chocolate, cosmetics and soaps, dehydrated foods, dyes, edible oils and fats, ice cream, instant foods, insecticides, inks, leather, macaroni and noodles, margarine, paints, petroleum products, pharmaceuticals, plastics, release agents, rubbers, sealing compounds, textiles, whipped toppings and antinutritional properties of lecithin are the aspects covered in this article. CSA

## Soy protein

478

Hagiwara (T), Kumagai (H), Matsunaga (T) and Nakamura (K). **Analysis of aggregate structure in food protein gels with the concept of fractal.** *Bioscience, Biotechnology and Bioengineering* 61(10); 1997; 1663-1667

The fractal structure of the aggregates in food protein gels was analysed. Three kinds of food protein gels were prepared: (1)  $\beta$ -lactoglobulin ( $\beta$ -LG) gel; (2) 11S soybean globulin gel; and (3) caseinate gel. From the concn. dependence of the gel elasticity, the fractal dimensions  $D_f$  of the aggregates in the gels were evaluated, according to the theory of Shih et al. These gels showed the weak-link behavior described in the theory of Shih et al. The values obtained for  $D_f$  were 2.6-2.7, which were larger than those predicted by the cluster-cluster aggregation model for a dilute system. In addition, for the  $\beta$ -LG gels, the fractal dimension was also evaluated from the analysis of the gel image obtained with a confocal scanning laser microscopy, the value being close to that evaluated from the concn. dependence of the gel elasticity. These results indicate that the elastic behavior of the aggregate gels is a reflection of fractal structure of the aggregates in the gels. AA

479

Samoto (M), Fukuda (Y), Takahashi (K), Tabuchi (K), Hiemori (M), Tsuji (H), Ogawa (T), Kawamura (Y). **Substantially complete removal of three major allergenic soybean proteins (Gly m Bd 30K, Gly m Bd 28K, and the  $\alpha$ -subunit of conglycinin) from soy protein by using a mutant soybean, tohoku 124.** *Bioscience, Biotechnology and Biochemistry* 61(12); 1997; 2148-2150

A wild-type soybean contains three major allergenic proteins, Gly m Bd 30K, the  $\alpha$ -subunit of conglycinin, and Gly m Bd 28K. A genetically mutated soybean (Tohoku 124), which was originally developed as a cv. lacking the  $\alpha$ - and  $\alpha$ -subunits of conglycinin, was also found to lack Gly m Bd 28K from immunoblot analysis using monoclonal antibodies specific to Gly m Bd 28K. This finding indicates the possibility to prepare soy milk and soy proteins containing none of the three major allergenic soybean proteins from this cv. By applying the previous removal procedure to Tohoku 124, the substantially complete removal of the 3 major allergenic proteins from the soy milk



was attained. The removal rates of Gly m Bd 30K,  $\alpha$ -subunit of conglycinin, and Gly m Bd 28K were 99.8, 100, and 100%, resp. AA

## TUBERS AND VEGETABLES

480

Negishi (O) and Ozawa (T). **Effect of polyphenol oxidase on deodorization.** *Bioscience, Biotechnology and Biochemistry* 61(12); 1997; 2080-2084

A mixture of purified polyphenol oxidases (PPO), or acetone powders prepared from fruits and vegetables, and polyphenolic compounds (PPs) totally eliminated a methylmercaptan odor. 2-Methyl-thiochlorogenic acid was isolated from the reaction mixture of methylmercaptan and chlorogenic acid with burdock acetone powder. Further, the formation of 5-methylthiochlorogenic acid and 2,5-bis(methylthio)-chlorogenic acid was suggested. These facts demonstrate that the o-quinone compounds formed from o-diphenols by PPO rapidly reacted with methylmercaptan. The oxidation reaction of PPs by using acetone powder containing PPO or peroxidase is considered to be more effective for removing bad smells from mouths and from the environment. AA

### Vegetables

#### Cabbage

481

Komatsu (W), Yagasaki (K), Miura (Y) and Funabiki (R). **Stimulation of tumor necrosis factor and interleukin-1 productivity by the oral administration of cabbage juice to rats.** *Bioscience, Biotechnology and Biochemistry* 61(11); 1997; 1937-1938

The effect of orally administering cabbage juice on tumor necrosis factor  $\alpha$  (TNF) and interleukin-1 (IL-1) productivity was studied in resident peritoneal macrophages from normal and hepatoma-bearing rats. The productivity of TNF and IL-1 was stimulated by gastric intubation of cabbage juice in the normal state, but not in the hepatoma-bearing state where the production of these cytokines had already been stimulated. From these results, cabbage may contain some effective component(s) that can be

absorbed from the gastro-intestinal tract to stimulate the production of TNF and IL-1. AA

#### Carrot

482

Ana (HMPS), Stringheta (PC), Brandao (SCC) and de Azeredo (RMC). **Carotenoid retention and vitamin A value in carrot (*Daucus carota* L.) prepared by food service.** *Food Chemistry* 61(1/2); 1998; 145-151

The objective of this work was to study the influence of different methods of food preparation routinely used by catering and food services (in large quantities) on the stability of  $\alpha$ -carotene,  $\beta$ -carotene and total carotenoids in carrots. Also, the values of vitamin A were evaluated. The methods of preparation studied were; raw shredded, steam cooking, water cooking with pressure, water cooking without pressure and moist/dry cooking. The quantification of  $\alpha$ - and  $\beta$ -carotenes was carried out by HPLC, using a reverse phase column (RP-18) with methanol:acetonitrile:ethyl acetate (80:10:10) as the mobile phase and a UV-visible detector. Total carotenoids were quantified spectrophotometrically at 449 nm. The results showed a retention ranging from 56.0 to 89.1% for the carotenoids, with the moist/dry cooking causing the greatest losses in  $\alpha$ - and  $\beta$ -carotene. Considering the type of utensils used, the time and temp., it was concluded that water cooking without pressure was best for reducing losses of carotenoids in carrots prepared by food service. Despite considerable losses in vitamin A value, carrots subjected to routine preparation methods by catering and food services remain a rich source of provitamin A. The methodology developed in this study is now being applied to carotenoid analysis in other vegetables prepared in large quantities. AA

#### Cassava

483

Leonel (M), Cereda (MP) and Roau (X). **Cassava bagasse as a dietary food product.** *Tropical Science* 38(4); 1998; 224-228

*Cassava bagasse*, the solid residue of the starch industry, was studied as a potential ingredient in high-fibre dietary products. The bagasse contained 80% of starch, 11.5% fibre, 1.14% ash and 0.85% of protein, and it had a pH of 5.8. Glucose was the



major sugar and the hemicellulose content was 22.31%. Microscopic analysis of the bagasse revealed a large number of starch granules inside the parenchyma cells and fibres, as well as outside the cells. The bagasse may be used in high-fibre products, and total or partial hydrolysis of its starch content might increase its commercial value. AA

## Kohlrabi

484

Ronnefahrt (B) and Tammen-Meyran (B). **Relation between the application of tolclofos-methyl and abnormal sensory quality of kohlrabis.** *Deutsche Lebensmittel-Rundschau* 93(8); 1997; 248-251 (De)

## Leafy vegetables

### Spinach

485

Lopez-Ayerra (B), Murcia (MA) and Garcia-Carmona (F). **Lipid peroxidation and chlorophyll levels in spinach during refrigerated storage and after industrial processing.** *Food Chemistry* 61(1/2); 1998; 113-118

Chlorophylls a, b and pheophytins a, b were quantitatively determined in raw, frozen and canned spinach. About 15.9% was lost during the freezing process and 99.9% after canning as a consequence of the heating used in industrial processing. Pheophytins a and b ( $3.28$  and  $3.00 \text{ mg kg}^{-1}$ ) were the predominant chlorophyll degradation derivatives for samples stored in a refrigerator at  $8^{\circ}\text{C}$  for 3 wks. The degradation limit of stored samples was around 13-15 days with  $2.54$  and  $1.30 \text{ mg kg}^{-1}$  for pheophytins a and b, resp. Lipid peroxidation during spinach senescence, as a consequence of being cold stored or processed, increased particularly during the canning process with  $3.40 \mu\text{mol}$  equivalent MDA. AA

### Potato

486

Wills (RBH) and Taabe (N). **Texture of prepared potato salad.** *Food Australia* 50(9); 1998; 457-459

This study determined the optimal firmness of boiled potato cubes by sensory evaluation, examined the

textural quality of potatoes in prepared potato salads (PS) obtained from supermarkets, and measured the rate of softening during cooking at different temp. Commercial PS salads showed highly variable firmness value both between and within batches. Consumers preferred boiled potato with a penetrometer firmness value of about  $0.5 \text{ kg}$ , but firmness in the range  $1.6$  to  $0.3 \text{ kg}$  was acceptable. Only 2 of 11 commercial PS had a high proportion of acceptable pieces; all other batches had greater than or equal to 25% of pieces which were mostly too firm; in one batch, all potato pieces were of an unacceptable texture. The rate of softening was highly dependent on water temp. Improvement in the quality of prepared PS could be achieved by more uniform cooking regimes and the use of quantitative firmness standards. SRA

487

Tawali (AB) and Schwedt (G). **Iron species and enzymatic browning in potatoes.** *Deutsche Lebensmittel-Rundschau* 93(12); 1997; 387-390 (De)

The enzymatic browning in potatoes (*Solanum tuberosum*) causes a decrease of the concn. of water soluble Fe as well as an increase of the ratio of Fe(III) to Fe(II) sp. and an increase of complexed Fe in the water soluble fraction. However, the Fe sp. do not influence the velocity of the enzymatic browning reaction, but likely they react with some polymer compounds, that are formed through polymerization and condensation after the enzymatic browning reaction. AA

488

Shirsat (SG) and Thomas (P). **Effect of irradiation and cooking methods on ascorbic acid levels of four potato cultivars.** *Journal of Food Science and Technology (India)* 35(6); 1998; 509-514

The changes in reduced and total ascorbic acid (AA) contents in control and in tubers irradiated to  $100 \text{ Gy}$   $\gamma$ -rays for sprout inhibition were studied by HPLC and indophenol titrimetry methods in four potato cvs. as a function of storage at  $15^{\circ}\text{C}$  and after cooking by different methods. Both reduced and total ascorbic acid levels decreased in control tubers during the first 3 months in storage recording resp. 22 to 35% and 26 to 45% losses depending on the cv. Irradiated tubers recorded additional losses of 5 to 10% and 6.5 to 13%, resp. in reduced and total ascorbic acid levels during the same period but remained in good



marketable conditions. Cooking of tubers in boiling water showed max. loss in vitamin C content, whereas pressure and microwave cooking recorded least losses. The magnitude of losses in reduced and total vitamin C during cooking was comparable in control and in irradiated tubers. AA

## Radish

489

Matsuoka (H), Toda (Y), Yanagi (K), Takahashi (A), Yoneyama (K), Uda (Y). **Formation of thioxopyrrolidines and dithiocarbamates from 4-methylthio-3-butenyl isothiocyanates, the pungent principle of radish, in aqueous media.** *Bioscience, Biotechnology and Biochemistry* 61(12); 1997; 2109-2112

Reaction products of 4-methylthio-3-butenyl isothiocyanate (MTBI), the radish pungent principle, in aqueous media were identified and their antimicrobial activities were examined. A rapid degradation of MTBI in aqueous media afforded a mixture of 3- (hydroxy) methylene-2-thioxo pyrrolidine (1), (Z)-3 -(methylthio)- methylene-2-thioxopyrrolidine (2), its (E)-isomer (3), methyl 4-methylthiobutyl dithiocarbamate (4), methyl (Z)-4-methylthio-3- butenyldithiocarbamate (5), and its (E)-isomer (6). The products 1, 2, and 3 were detected at all pHs examined, while 4, 5, and 6 were formed at pH over 6.0. The formation of 4 from 6 was accompanied by an oxidation of methanethiol released from MTBI in aqueous media. Antimicrobial activities of 2 and 3 against all microbes examined were much lower than that of 1, which had MICs ranging from 50 to 400 µg/ml. As for 4, 5, and 6, antifungal activities were comparable to that of 1, but little antibacterial activities were observed. The antimicrobial activities of the 6 products were considered to be far lower than that of MTBI. AA

## Sweetpotato

490

Das (GP). **The control of the sweet potato weevil in storage.** *Tropical Science* 38(4); 1998; 196-197

The efficacy of some indigenous materials (IMS) (sand, saw dust, ash and rice husk), mosquito nets and phosphamidon (demecron) 100 WSC in controlling sweetpotato weevil (SPW) during storage was tested. After 1 and 2 months of storage there was no weevil infestation in roots covered with sand,

saw dust, ash or rice husk. Roots sprayed with demecron had 34% infestation after 1 month and reached 100% in 2 months. Roots covered with mosquito net had 100% infestation after 1 month. Sweet potato roots heaped on the floor and completely covered with 2 cm thick layer of IMS were either free from SPW infestation (sand and rice husk) or with negligible infestation (saw dust and ash) after 3 months of storage. SRA

## FRUITS

491

Jobling (JJ), Richardson (KC) and Patterson (BD). **Freshness in convenience fruit and vegetables.** *Food Australia* 50(9); 1998; 443-446

Time between processing and point of sale, small fruit and vegetables to reduce cutting injury, genetic approaches, conditions influencing the rate of aging control of temp., atm. composition, removal of ethylene and microorganisms and washing are topics discussed. SRA

## Apples

492

Lu (Y) and Foo (Y). **Constitution of some chemical components of apple seed.** *Food Chemistry* 61(1/2); 1998; 29-33

The hexane extract of apple seed was analyzed by GC-MS and found to consist mainly of fatty acids (80.9%) in its volatile fraction with linoleic acid as the most dominant one (51.2%), followed by palmitic, linolenic, stearic and oleic acids (10.5, 5.6, 4.3 and 4.1%, resp.). The seed pomace was further extracted with 70% aqueous acetone to yield 2 major compounds, [(6-O-β-D- glucopyranosyl-β-D- glucopyranosyl) oxy]benze- neacetonitrile (amygdalin) (1) and phloretin-2'-β-D- gluco pyranoside (phloridzin) (2), which were identified by NMR spectroscopy. A number of minor polyphenols were also identified using HPLC/DAD as chlorogenic acid, p-coumaric acid, p-coumaric quinic acid, 3-hydroxyphloridzin, phloretin-2'-xyloglucoside and quercetin glycosides. AA

493

Thakur (NK), Chopra (SK) and Kaushal (BBL). **Screening of bioregulators on ripening**



behaviour of apples during storage. *Journal of Food Science and Technology (India)* 35(6); 1998; 533-536

Treatment of fruits *E. royleana* latex at 500 ppm and Protozyme at 1000 ppm resulted in lowest physiological loss in wt., while fruits treated with *E. royleana* latex at 250 ppm, Protozyme at 500 ppm and Agrostemin at 100 ppm had higher total soluble solids content at the end of a stipulated storage period of 7 months. Fruits treated with Agrostemin at 100 ppm, Paras at 1000 ppm, *E. royleana* latex and protozyme each at 500 ppm recorded higher firmness. Agrostemin, *E. royleana* latex, Protozyme and Biozyme each at 300 ppm exhibited steadier increases and decreases in respiration and ethylene evolution rates. However, much faster changes were exhibited by fruits treated with Paras at 3000 ppm. Thus, Agrostemin, *E. royleana* latex, Biozyme and protozyme each at 500 ppm were found highly effective in slowing and steadying the metabolic rate of the fruit as appraised by respiration and ethylene evolution rates throughout the 7 months storage at 0 plus or minus 1°C. AA

494

Joshi (VK), Shashi Jaiswal and Kaushal (BBL). **Apple Pomace: Effect of sulphur dioxide and temperature on its preservation and medium optimization for yeast biomass production.** *Journal of Scientific and Industrial Research* 57(10,11); 1998; 692-697

To store apple pomace (a by-product of apple juice processing industry) in the form of pulp at 25°C temp., a concn. 2500 ppm potassium metabisulphite (KMS) is found optimum, as it induces min. changes in the parameters, such as titratable acidity, total sugar, microbial count and colour of the pomace. For Baker's yeast manufacture, use of 1.8% ammonium sulphate under sterilized conditions has given the highest yeast biomass, and highest ethanol by *Saccharomyces cerevisiae* out of the 3 yeasts tried, i.e. *Saccharomyces cerevisiae*, *Candida utilis* and *Torula utilis*. Results with 150 ppm of SO<sub>2</sub> as KMS are found to be comparable with those obtained with steam sterilized treatments. Addition of yeast extract (3g/L), beef extract (3g/L) and peptone (5g/L) to the apple pomace produces the highest biomass and ethanol. The addition of mineral nutrients along with these ingredients (beef extract, 3g/L, yeast extract, 3g/L and peptone, 5 g/L) is observed to be best. The optimum dilution level of apple pomace is found to be 1:6 for the max. production of yeast biomass. AA

495

Batt (PJ) and Sadler (C). **Consumer attitudes towards the labelling of apples.** *Food Australia* 50(9); 1998; 449-450

## Banana

496

DeCosta (DM) and Subasinghe (SSNS). **Antagonistic bacteria associated with the fruit skin of banana in controlling its postharvest diseases.** *Tropical Science* 38(4); 1998; 206-212

Bacterial isolates (BI) associated with the fruit skin of banana were studied as potential biological control agents of postharvest diseases of banana. All the BI completely inhibited the spore germination and appressoria formation of *Colletotrichum musae*, 18 h after treatment. A complete lysis of conidia was observed after 24 h. In *in vitro* tests, the antagonists inhibited the growth of *Fusarium* spp., *C. musae*, *Botryodiplodia* spp. and *Ceratocystis paradoxa* 42, 39, 30 and 30% resp. In *in vitro*, the bacterial mixture significantly inhibited the crown rot development (CRD) by *C. musae* (P greater than or equal to 0.05). All the other pathogens except *C. paradoxa* showed potential inhibition of CRD. SRA

## Citrus fruits

497

Anastassiades (M) and Scherbaum (E). **Multiresidue methods for determination of pesticide in citrus fruits by GC-MSD.** *Deutsche Lebensmittel-Rundschau* 93(10); 1997; 316-327 (De)

## Gooseberry

498

Premi (BR), Sethi (V) and Saxena (DB). **Studies on identification of white specks in cured aonla (*Emblica officinalis* Gaertn.) fruits.** *Food Chemistry* 61(1/2); 1998; 9-11

Aonla (*Emblica officinalis* Gaertn.), an Indian vitamin C-rich fruit, has great potential for pickling but the development of white specks during curing and pickling is a major hindrance. Studies to evaluate the effects of various pretreatments on the development of white specks were carried out. The extent of white specks was less in aonla fruit segments preserved



in steeping sol. containing 10% salt and 0.04% KMS than in those preserved by dry, salting with 10% salt and 0.02% KMS during one month of storage. The fruits which developed white specks were poor in texture and brownish in colour. These white specks were isolated and extracted with water. The white specks thus obtained were purified as white solid matter. This was insoluble in water and other common organic solvents but soluble in alkali sol. The IR and <sup>1</sup>H NMR spectra and mp confirmed that the white solid matter isolated and purified from white specks of preserved fruits was mucic acid (D-galactaric acid). Its mineral analysis indicated the formation of some unknown complex of this compound with Ca and K. AA

## Guava

499

Hallman (GJ). **Efficacy of methyl bromide and cold storage as disinfestation treatments for guavas infested with Caribbean fruit fly.** *Tropical Science* 38(4); 1998; 229-232

Methyl bromide (MB) fumigation and cold storage were investigated as treatments to disinfest guavas of Caribbean fruit fly, *Anastrepha suspensa* (Loew). Cold storage at 1 or 3°C for 16 days resulted in excessive chilling injury damage and lack of ripening compared with the control at 7°C. Guavas tolerated MB fumigations up to 20 g/m<sup>3</sup> for 2 h at 24°C. However, that dose did not provide quarantine security, defined as 99.9968% mortality with 95% confidence and estimated to be attained at 28-33 g/m<sup>3</sup>. Although quarantine security was not achieved with MB fumigation alone without unacceptable damage to the guavas, perhaps it could be achieved with a combination treatment involving no more than 20 g/m<sup>3</sup> of MB coupled with some other treatment, such as heat or irradiation. AA

## Pineapple

500

Pokharkar (SM) and Prasad (S). **Water desorption isotherms of osmotically concentrated pineapple.** *Journal of Food Science and Technology (India)* 35(6); 1998; 518-520

Water desorption isotherms were determined for osmotically conc. pineapple at 30°, 40° and 50°C. The shapes of the isotherms fell under the category of type III according to BET classification. At high a<sub>w</sub>,

leaching of the sugar was observed and it was more pronounced at higher temp. The data were fitted to the two parameter equations taking into account the temp. effect. The effect of a<sub>w</sub> and temp. on the equilibrium moisture content was best described for osmotically conc. pineapple by Oswin equation. The osmotically conc. pineapple slices at 30°C and 0.5 a<sub>w</sub> gave a moisture content of 12.5% (db). AA

## Raisin

501

Gowda (IND). **Advances in the improvement of raisin quality.** *Indian Food Industry* 17(4); 1998; 218-223

Discusses the various factors that influence the quality of raisins such as the raw material used, pre-treatments given prior to drying (alkali treatment, dipping oil treatment, sulphur fumigation), drying or dehydration methods (sun-drying, shade-drying, drying in electrical driers, drying in solar driers, post-drying processes), package and storage conditions used when stored for longer periods. CSA

## Strawberry

502

Ulrich (D), Krumbein (A) and Rapp (A). **Analysis of aroma compounds in strawberry, sour cherry and tomato by gas chromatography after solid phase micro extraction.** *Deutsche Lebensmittel-Rundschau* 93(10); 1997; 311-316 (De)

## CONFECTIONERY, STARCH AND SUGAR

### Starch

503

Maruta (I), Kurahashi (Y), Takano (R), Hayashi (K), Kudo (K-i), Hara (S). **Enzymic digestibility of reduced-pressurized, heat-moisture treated starch.** *Food Chemistry* 61(1/2); 1998; 163-165

The digestibility of the reduced-pressurized heat-moisture treated corn starches by α-amylase and glucoamylase was studied. By the treatment, regular and waxy corn starch granules were well



digested by  $\alpha$ -amylase without gelatinization, while the digestibility of the high amylose corn starch was reduced. Both regular and waxy corn starches, regardless of the treatment, were digested well by enzymes under the gelatinized condition. However, a drastic increase of indigestible portion was observed in the high amylose corn starch. Methylation analysis of the enzyme resistant moiety of the high amylose starch indicated that most of the indigestible moiety was composed of amylose. These findings suggested that the arrangement of regular or waxy corn starch molecules was made more random by the treatment while, in the high amylose corn starch molecule, crammed amylose formed the highly associated structure. AA

504

Lin (P-Y) and Czuchajowska (Z). **Role of phosphorus in viscosity, gelatinization, and retrogradation of starch.** *Cereal Chemistry* 75(5); 1998; 705-709

The effect of starch crystallinity and P on starch gelatinization and retrogradation were studied using wide-angle X-ray powder diffraction, cross polarization/magic angle spinning (CP/MAS)  $^{13}\text{C}$  nuclear magnetic resonance (NMR) spectroscopy,  $^{31}\text{P}$  NMR spectroscopy. Rapid Visco Analyzer (RVA) and differential scanning calorimetry (DSC). Two starches differing significantly in peak viscosity (cv. Stephens, 283 BU; cv. Crew, 560 BU) were comparable in amylose content and starch crystallinity, while differing significantly in phospholipids content. Starch of lower peak viscosity had a higher phospholipids content and showed a slower rate of retrogradation. Starch from Stephens (0.098% P) had an enthalpy value of retrograded starch of 2.2 J/g after 14 days of storage, while starch from Crew (0.062% P) had an enthalpy value as high as 4.4 J/g. Defatting with a hot n-propanol and water (3:1) mixture caused substantial changes in peak viscosity. Peak viscosity for starch from Crew decreased by 75 RVU due to defatting, while starch from Stephens decreased by as much as 125 RVU. After defatting, with the hot n-propanol water mixture, the rate and extent of starch retrogradation were comparable between the prime starches, which differed significantly in peak viscosity. AA

## Sugar

505

Stone (VC). **On line instrument for measuring optical density of various juice streams in a sugar factory.** *Indian Sugar* 48(6); 1998; 419-420

The mechanical and electronic aspects of a multichannel instrument developed are described, to measure the clarity of sugarcane juice. It also detects the presence of mud at sampling points on the clarifier and measures the clarity of the filtrate to check the performance of the filters. SD

## Honey

506

Uren (A), Serifoglu (A) and Sankahya (Y). **Distribution of elements in honeys and effect of a thermoelectric power plant on the element contents.** *Food Chemistry* 61(1/2); 1998; 185-190

Lead, Cd, Fe, Cu, Zn, Mn, Ca, Mg and K contents of Turkish honeys were investigated. Most of the elements were more abundant in honeydew honeys than in flower honeys. But Ca content of honeydew honeys was smaller than in flower honeys. Considerable temporal fluctuation of elements was observed in honeydew honeys produced in the same area and from the same hives during autumn 1992, 1993 and 1994. Element contents of Turkish honeys showed high coeff. of variation, and the coeff. of variation decreased with increasing amounts of total minerals in honeys. The thermoelectric power plant which was 15-18 km away from the hives did not cause any pollution in honeys. Turkish honeys did not show any contamination of Pb, Cd, Fe or Zn, and amounts of these elements were found well below the permitted limits. AA

## Jaggery

507

Patil (JP) and Adsule (PG). **Studies on various quality parameters for grading of jaggery.** *Indian Food Industry* 17(4); 1998; 215-217

Physical parameters such as colour, texture, hardness, taste (flavour/aroma) and chemical analysis of jaggery to estimate sugars, moisture content, pH, extraneous matter etc. are the various criteria fixed for the grading of jaggery. CSA



Zende (GK), Ruikar (SK) and Joshi (SN). **Effect of application of vermicompost along with chemical fertilizers on sugarcane yield and juice quality.** *Indian Sugar* 48(5); 1998; 357-369

Effect of application of vermicompost (VC) along with NPK in 12 different combinations was studied with suru sugarcane (cv. CoC 671) in 1996 at Jadhav Wadi, Maharashtra, India. The treatments showed low percent of germination, tiller ratio optimum and growth parameters are compared. The yield parameters varied from 90 metric t/ha (10t/ha of VC) to 130 metric tonnes/ha (5t/ha of VC +100% recommended dose of NPK). Application of VC alone at 5t/ha showed more or less similar trend as shown by NPK alone. Increasing the dose of N in an organic form from 50 kg/ha to 250 kg/ha improved the quality of juice. SD

## BAKERY PRODUCTS

Kadharmestan (C), Baik (B-K) and Czuchajowska (Z). **Whey protein concentrate treated with heat or high hydrostatic pressure in wheat-based products.** *Cereal Chemistry* 75(5); 1998; 762-766

Commercial whey protein concn. (CWPC) treated with heat or with high hydrostatic pressure (HHP) was incorporated by replacement into wheat flour, and its effects on dough rheology and the quality of cookies, noodles, and bread were evaluated. Wheat flour fortified with heat- or HHP-treated CWPC produced smaller cookies than those fortified with untreated CWPC. Increasing the fortification level of heat- or HHP treated CWPC from 5 to 10% further decreased cookie diam. The water absorption for noodle dough decreased by 5% with 10% fortification of untreated CWPC. Both heat- and HHP-treated CWPC increased water absorption from 33% in the control to 35.8%. Incorporation of untreated CWPC decreased the lightness (L) value of Cantonese noodle dough, while dough fortified with heat- or HHP-treated CWPC had higher L values compared to those of the control. Yellowness (b) was improved with incorporation of both untreated and treated CWPC. Cooking loss of Cantonese noodles fortified with untreated or heat- or HHP-treated CWPC was comparable to lower

than that of the control. Incorporation of untreated CWPC increased hardness and cohesiveness of Cantonese noodles. Noodles fortified with heat- or HHP-treated CWPC had similar hardness and were softer than the control and the noodles fortified with untreated CWPC. Wheat flour fortified with 10% untreated CWPC produced wet and sticky bread dough and a small loaf (730 mL). Handling properties of dough were improved and bread vol. was increased by 50 mL when heat- or HHP-treated CWPC was incorporated. Incorporation of 10% CWPC increased protein content of bread up to 20.2% and also increased the proportion of essential amino acids. AA

## Biscuit

Bernussi (ALM), Chang (YK) and Martinez-Bustos (F). **Effects of production by microwave heating after conventional baking on moisture gradient and product quality of biscuits (cookies).** *Cereal Chemistry* 75(5); 1998; 606-611

After conventional (forced-convection heating) baking at 240°C for 4 min, biscuits (cookies) were baked further in a microwave oven at medium and high settings (617.3 and 745.5 W, resp.) to study the effects of microwave baking on the moisture gradient and overall quality of the cookies. Microwave baking significantly ( $P < 0.05$ ) reduced the moisture gradient and total moisture content of the cookies. Initially, a complete factorial design at baking times of 15, 20, 30, and 40 sec with microwave ovens at high and medium power settings was used to evaluate the moisture gradient and total cookie moisture content. Applying high and medium microwave settings for 30 or 40 sec, resp., avoided cracking, although the products were slightly darker. Treatment at a high power setting for 20 sec resulted in a moisture gradient of 1.11% cm and 2.8% cracking. Gradients  $> 1.5\%$  cm produced significant levels of cracking. Cookies postbaked at a medium microwave power setting for 29 sec produced the same moisture gradient as a high microwave power setting for 23 sec, which was significantly ( $P < 0.05$ ) lower than the control (cookies baked using the traditional process). The cookies were softer and the colour did not differ significantly from that of the control. The expansion ratio of the control sample (11.3) was significantly higher than the combined process sample (10.7), showing a shrinkage effect attributed to the microwave treatment. The removal of the residual moisture during microwaving also



increased product wt. losses (from 0.912 to 0.956 g).  
AA

511

Pratima Awasthi and Yadav (MC). **Effect of incorporation of liquid dairy by-products on sensory and storage characteristics of soy-fortified biscuits.** *Journal of Food Science and Technology (India)* 35(6); 1998; 493-498

Three types of biscuits viz., biscuits containing 15% defatted soy flour (DSF); 15% DSF with water: channa whey (25:75) and 15% DSP with water: skim milk (50:50) were prepared. Control biscuits made from wheat flour, water and other ingredients were used for comparison. These biscuits were evaluated for their storage characteristics. The biscuits were packed in two different types of packaging materials viz., high density polypropylene film (160 gauge) and laminate of cellophane (150 gauge) and stored under ambient conditions. The av. min. and max. RHs were 62 plus or minus 15.2 and 84.1 plus or minus 9.9%, resp. The biscuit samples packed in laminated packaging materials stored well for 30 days, whereas those packed in polypropylene films could be kept for 45 days. AA

## Bread

512

Hayman (DA), Hoseneey (RC) and Faubion (JM). **Effect of pressure (crust formation) on bread crumb grain development.** *Cereal Chemistry* 75(5); 1998; 581-584

Previous work showed that the critical changes in crumb grain occurred during the early stages of baking. Oven spring and crust formation also occurred during this time. To determine whether the stress caused as a result of expansion during oven spring was related to the deterioration of crumb grain, doughs were baked at different heating rates to produce different expansion rates in an electrical resistance oven (ERO). The heating rate did not affect crumb grain, thus showing that the stress developed during oven spring are not related to changes in crumb grain. Therefore, 2 flours were selected that produced bread of different crumb grains when baked conventionally. However, when the 2 flours were baked in the ERO they gave similar (and fine) crumb grains. The ERO produces bread with no crust. This suggests that pressure in the dough resulting from crust formation during baking

is one factor that affects the crumb grain of bread. Adding wt. to the surface of the loaf to simulate crust formation caused the grain to change from good to poor as the wt. was increased. Results from subsequent ERO baking studies suggest that the temp. range over which the gas cell walls of a wheat flour dough are most susceptible to coalescing is 60-70°C. AA

513

Hayashi (M) and Seguchi (M). **Iron-enriched bread with Karkade (*Hibiscus sabdariffa*) and wheat flour.** *Cereal Chemistry* 75(5); 1998; 686-689

Karkade (*Hibiscus sabdariffa*) was blended with wheat flour to make bread. When 0.5% Karkade was blended with wheat flour, max. bread height and specific vol. (cm<sup>3</sup>/g) were obtained (pH 4.8-5.0); these properties gradually deteriorated with increased Karkade. The pH of the bread crumb decreased with increased Karkade, reaching pH 3.5 when blended with 10% Karkade. The pH of Karkade alone was 2.5, which was adjusted to approx. equal to 5.0 by the addition of alkali just before blending with wheat flour and making bread. Control of the karkade pH resulted in bread height and specific vol. recovering to the original optimal levels. In addition, the deep reddish purple color (513 nm) of the bread crumb changed to a brownish color crumb. The Fe content was 0.14 mg of Fe/g of dry crumb, or 6.22 mg of Fe/60 g of fresh bread when 5% Karkade was blended with wheat flour. AA

514

Zhang (D), Moore (WR) and Doehlert (DC). **Effects of oat grain hydrothermal treatments on wheat-oat flour dough properties and breadbaking quality.** *Cereal Chemistry* 75(5); 1998; 602-605

Hydrothermal treatments, which are routine in oat processing, have profound effects on oat flour dough rheological properties. The influence of roasting and steam treatments of oat grain on dough mixing and breadbaking properties was investigated when hydrothermally treated oat flour was blended with wheat flour. Roasting of oat grain (105°C, 2 h) resulted in oat flours that were highly detrimental to wheat flour dough mixing properties and breadbaking quality. Steaming (105°C, 20 min) or a combination of roasting and steaming of oat grain significantly improved the breadbaking potential of the oat flours. The addition of oat flours increased



water absorption and mixing requirements of the wheat flour dough and also decreased bread loaf vol. However, at the 10% substitution level, steamed oat flours exhibited only a gluten dilution effect on bread loaf vol. when wheat starch was used as a reference. Oat flour in the breadbaking system decreased the retrogradation rate of bread crumb starch. The results indicate that adequate hydrothermal treatments of oat grain are necessary for oat flour breadbaking applications. Steamed oat flours used at a 10% level retarded bread staling without adversely affecting the loaf vol. AA

515

Hayman (DA), Hosenev (RC) and Faubion (JM). **Bread crumb grain development during baking.** *Cereal Chemistry* 75(5); 1998; 577-580

Scanning electron microscopy was used to study gas cell size, shape and distribution throughout the breadmaking process. Flours that produced bread with a relatively good grain and a relatively poor grain were used. Micrographs of the dough samples were taken at mixing; before and after each of 2 punches; before and after panning; after proofing; and after 12, 18, and 24 min (complete) of baking. No differences were found between the 2 flours at any dough stage. However, after 12 min of baking, the cell distributions were different between the doughs. These results suggest that the crumb grain differentiates during the early stages of baking. The changes documented during this time, i.e., cells becoming larger and the cell walls thicker, indicate that some gas cells coalesce during the early stages of baking and that this is reflected in the crumb grain of the bread. AA

516

Wang (L), Miller (RA) and Hosenev (RC). **Effects of (1-3)(1-4)- $\beta$ -D-glucans of wheat flour on breadmaking.** *Cereal Chemistry* 75(5); 1998; 629-633

Water-soluble nonstarch polysaccharides were extracted from commercial hard red winter wheat flour and separated into three fractions by graded ethanol precipitation. The three fractions, F15, F40, and F60, varied in polysaccharide composition. Fraction F15 was rich in water-soluble (1-3)(1-4)- $\beta$ -D-glucans, and fractions F40 and F60 were rich in arabinoxylans. Addition of individual fractions to a bread formula did not affect bread loaf vol. Addition of fraction F15 to the formula improved bread crumb grain. Treatment of (1-3)(1-4)- $\beta$ -D-

glucan-rich fractions F15 with lichenase before its addition to the bread formula resulted in bread with poor crumb grain. Treatment of the F15 fraction with  $\beta$ -xylanase before its addition to the bread formula resulted in bread with slightly improved crumb grain. Presumably, the (1-3)(1-4)- $\beta$ -D-glucans in fraction F15 improved crumb grain by stabilizing air cells in the bread dough and preventing coalescence of the cells. Addition of pentosan-rich fractions F40 and F60 to the bread formula did not improve crumb grain and interfered with the improving effect of (1-3)(1-4)- $\beta$ -D-glucan-rich fraction F15. Hydrolysis of the arabinoxylans in flour by adding  $\beta$ -xylanase to the bread formula resulted in improved crumb grain. AA

517

Liao (Y), Miller (RA) and Hosenev (RC). **Role of hydrogen peroxide produced by baker's yeast on dough rheology.** *Cereal Chemistry* 75(5); 1998; 612-616

Baker's yeast, *Saccharomyces cerevisiae*, has a well-known effect on dough rheology during breadmaking. During a 3 h fermentation,  $H_2O_2$  produced by yeast (0.76%, fwb) increased from 1.09 to 2.32  $\mu\text{mol/g}$  of flour. The spread test, a measure of a dough's rheological properties, showed that yeast had an effect on dough rheology similar to that of  $H_2O_2$ , an oxidant that makes flour-water dough more elastic. In additional experiments (spread test and  $H_2O_2$  measurement), glucose oxidase, an enzyme that produces  $H_2O_2$ , gave results similar to those with yeast. The fact that catalase, an enzyme that destroys  $H_2O_2$ , reversed the rheological effect of added  $H_2O_2$  but did not reverse the effect of either yeast or glucose oxidase suggested that either wheat flour contains an inhibitor to catalase or  $H_2O_2$  was not the active component. A series of experiments, including use of defatted flour, remixing, and mixing dough under nitrogen, all indicated that catalase was inhibited by peroxides in the lipid fraction of flour. These results also suggested that  $H_2O_2$  is responsible for the effects of yeast and glucose oxidase on dough. AA

518

Hayman (DA), Sipes (K), Hosenev (RC) and Faubion (JM). **Factors controlling gas cell failure in bread dough.** *Cereal Chemistry* 75(5); 1998; 585-589



Stress relaxation in the wall of a gas bubble, as measured by the alveograph, was used to study surface tension at the gas-dough interface of doughs from flours producing differing bread crumb grains. The surface tensions in the various wheat flour doughs were not different. Dough rheological properties, as measured by both dynamic oscillatory rheometry and lubricated uniaxial compression, were not different for doughs made from wheat flours that gave breads with different crumb grains. However, when the effect of starch granule size on gas cell wall stability was tested, the presence of a greater proportion of large starch granules in wheat flour dough was sufficient to result in gas cell coalescence and open crumb grain in the final baked product. This suggests that starch granule size is at least one of the factors that affects the crumb grain of bread. AA

## Cookies

519

Leon (AE), Jovanovich (G) and Anon (MC). **Gelatinization profiles of triticale starch in cookies as influenced by moisture and solutes.** *Cereal Chemistry* 75(5); 1998; 617-623

Starch physicochemical parameters and phase transitions were determined in flours of 10 advanced lines and cvs. of triticale (Cananea, Currency, Eronga, LA 24 Bve, LA 20 FCA, LA 83 FCA, Tatu, Tehuelche, Quine, and Yagan). Starch behavior was also analyzed during the baking of cookies prepared with triticale flours. Starch granule size, crystal type patterns, and size distribution were determined by light microscopy, X-ray diffraction, and gel-permeation chromatography, resp. Two types and sizes of starch granules with characteristic A-form crystals were obtained in all samples tested. The Quine cv. showed the lowest extent of starch crystallinity. Only a monophasic endotherm was found by differential scanning calorimetry for water content > 50-60%. Gelatinization temp. and enthalpy values varied significantly among samples. A biphasic endotherm was detected for water contents between 35 and 60%, and no endothermic transitions were observed for water levels < 35%. Only one endotherm corresponding to starch gelatinization was detected in baked cookies prepared with 5 triticale flours. In all samples, the highest enthalpy of gelatinization of starch was detected for the cookie surface, whereas the highest gelatinization temp. was observed for the center. These differences may be attributed to the presence

and content of the solutes in cookie dough and also to the degree of starch gelatinization during the cooking process. AA

520

Donelson (JR) and Gaines (CS). **Starch-water relationships in the sugar-snap cookie dough system.** *Cereal Chemistry* 75(5); 1998; 660-664

Prime starch was extracted from soft and hard wheat flours and ball-milled to produce 100% damaged starch. Small amounts of the ball-milled starch or a pregelatinized starch were added to sugar-snap cookie formulations. Other cookie doughs were produced from prime starch only (no flour) with small amounts of the ball-milled starch added. Starch damages of the resulting substituted soft and hard wheat flours and soft and hard wheat prime starches were determined and compared to diam. of sugar-snap cookies produced from the control and treatments. Soft wheat flour and starches produced larger diam. cookies than their hard wheat counterpart at all levels of damaged starch. Both sources of damaged starch (ball-milled or pregelatinized starch) had similar effects on cookie diam. Cookies produced from all starch (no flour) were similar to their respective flour controls at approx. equal to 8% damaged starch. To produce the same size cookie as that produced by soft wheat flour and starch, hard wheat flour and starch cookie formulations required less damaged starch and had lower alkaline water retention than did the soft wheat flour and starch cookie formulations. Other flours were treated with chlorine gas to pH 4.8. Pregelatinized starch (approx. equal to 5%) was required to reduce the cookie diam. as much as chlorine treatment did. Results suggest unique quality differences between soft and hard wheat starch as they function in sugar-snap cookie baking. The functional results of those different are not adequately quantified by the estimation of damaged starch level. AA

## Dough

521

Castello (P), Jollet (S), Potus (J), Baret (J-L) and Nicolas (J). **Effect of exogenous lipase on dough lipids during mixing of wheat flours.** *Cereal Chemistry* 75(5); 1998; 595-601

In control dough, endogenous wheat lipase was inactive, because the triacylglycerol (TAG),



1,2-diacylglycerol (DAG<sub>1,2</sub>), and 1,3-diacylglycerol (DAG<sub>1,3</sub> fractions of nonpolar lipids were not affected by mixing. Conversely, the free fatty acid (FFA) and monoacylglycerol (MAG) fractions decreased, mainly due to the oxidation of polyunsaturated fatty acids (PUFA) catalyzed by wheat lipoxygenase. Addition of exogenous lipase to flour (15 lipase units [LU] per gram of DM) resulted in substantial modification of nonpolar lipids during dough mixing. Due to the 1,3 specificity of the lipase used in this experiment, the TAG and DAG<sub>1,3</sub> fractions decreased, whereas the MAG and FFA fractions increased. The DAG<sub>1,2</sub> fraction increased at the beginning of mixing and decreased after 40 min of mixing. Moreover, part of the PUFA released by lipase activity was oxidized by wheat lipoxygenase, resulting in major losses of PUFA. Conversely, the net content of the saturated and monounsaturated fatty acids (SMUFA) remained constant, because the free SMUFA content increased primarily at the expense of the esterified forms. For a constant mixing time of 20 min, increasing the amount of lipase added to dough (from 2.5 to 25 LU/g of DM) resulted in a linear decrease in the TAG fraction and a linear increase in the SMUFA content in the FFA fraction. At the same time, the PUFA content of the FFA fraction increased only for additions of lipase to flour of > 5 LU/g of dry matter, due to partial oxidation by wheat lipoxygenase. AA

## Pasta

522

Fardet (A), Baldwin (PM), Bertrand (D), Bouchet (B), Gallant (DJ), Barry (J-L). **Textural images analysis of pasta protein networks to determine influence of technological processes.** *Cereal Chemistry* 75(5); 1998; 699-704

The structure of pasta is largely governed by the presence of a structured protein network. This work analyzed the protein network textures of various cooked pasta products through textural image analysis. Six different pasta types were investigated: reference pasta made from durum semolina; pasta enriched with gluten proteins from soft wheat flour at 10 and 20%; autoclaved pasta; soft wheat flour pasta; and pasta made from reconstituted flour fractions. Pasta samples were sectioned, and each cross-section consisted of three distinct zones (central, intermediate, and external) based on the state of swelling of starch granules for each pasta product. Digital images of the protein network in

each zone were acquired using confocal laser scanning microscopy. Textural image analysis was then performed. Similarities and differences in protein network texture were assessed by principal component, stepwise discriminant, and variance analyses. With the exception of autoclaved pasta, protein network structure differed greatly with the position in the pasta. Furthermore the effect of technological treatments was greatly influenced by the position in pasta. The most significant differences in protein network structure were obtained with the autoclaved and 20% protein-enriched samples. AA

## Snacks

523

Bawa (AS) and Singh (H). **Preparation, nutritional improvement, packaging and storage of Matar. A traditional Indian snack.** *Journal of Food Science and Technology (India)* 35(6); 1998; 537-539

Effect of supplementing refined wheat flour, traditionally used for the preparation of *matar*- a North Indian deep-fat-fried snack, with *Bengalgram* flour (*Besan*), on its quality and shelf life was investigated. Incorporation of 25% *Besan* and 15% fat into the dough during its preparation gave a highly acceptable product with excellent texture. The optimum frying time at 150 plus or minus 5°C was 4.5-5.0 min. The equilibrium RH of the product was 27%. The samples stored well upto 60 days in 250 gauge HDPE and LDPE pouches as evidenced by sensory panel data. AA

## MILK AND DAIRY PRODUCTS

524

Patel (RS) and Renz - Schanen (A). **Dietary calcium and its role in disease prevention.** *Indian Dairyman* 50(10); 1998; 49-51

Availability of Ca in dairy products, has beneficial health effects in preventing osteoporosis, stroke and in providing protection against colon cancer and kidney stones. It also prevents endometrial cancer in women and it helps bone gain in children. Ca to protein ratio (16:1 mg:g) is very good for human health. GS



525

Zayed (G) and Winter (J). **Removal of organic pollutants and of nitrate from wastewater from the dairy industry by denitrification.** *Applied Microbiology and Biotechnology* 49(5); 1998; 469-474

526

Byrne (M). **Dairy manufacturing: A new lease on life.** *Food Engineering International* 23(3); 1998; 49-50, 52

Discusses the new technique that has been developed which extends the shelf-life of milk and dairy products without impairing the taste. CSA

527

Musaiger (AO), Al-Saad (JA), Al-Hooti (DS) and Khunji (ZA). **Chemical composition of fermented dairy products consumed in Bahrain.** *Food Chemistry* 61(1/2); 1998; 49-52

Physical, proximate and mineral composition of 4 types of fermented dairy products commonly consumed in Bahrain were analysed. The findings revealed that acidity, total solids and solids not-fat were found to be higher in yoghurt and labenah (thick yoghurt) compared to low and full fat laban (diluted yoghurt). Moisture content was lower in labenah (77.0%) than other fermented dairy products (85.4-89.4%). Protein level was highest in labenah (7.6%) and lowest in low fat laban (3.2%). Na concn. ranged from 55.9 mg 100 g<sup>-1</sup> in low fat laban to 143 mg 100 g<sup>-1</sup> in labenah, while Ca content ranged between 120-167 mg 100 g<sup>-1</sup>. In general, some chemical compositions of various types of fermented dairy products studied differed from the corresponding compositions reported in the literature. This can be attributed to type of milk used, method of preparation, type and proportion of starters and consumer preferences. AA

## Milk

528

Bandyopadhyaya (P), Ravindra Kumar and Chawla (NK). **Suitability of buffalo milk or a mixture of buffalo and cow milk for cheesemaking.** *Indian Dairyman* 50(11); 1998; 33-38

Aspects considered include: zoological classification, gross composition, protein

composition, fat composition, Ca content in cow and buffalo milk, flavour and aroma, Indian experience with buffalo milk and mixture of cow and buffalo milk, modified techniques used in cheesemaking (coagulation of milk, synersis, heat treatment and whey removal) and international trade in buffalo milk cheeses. BV

529

Sharma (R) and Lal (D). **Influence of various heat processing treatments on some B-vitamins in buffalo and cow's milks.** *Journal of Food Science and Technology (India)* 35(6); 1998; 524-526

Heating caused considerable losses of B-vitamins (B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub> and folic acid) in buffalo and cow's milks depending upon the severity of heat treatments. Riboflavin was relatively stable to heat. Thiamine, pyridoxine and folic acid were found to be less stable to heat, the latter being the most heat labile. Losses of all the vitamins studied were relatively higher in cow's milk than in buffalo milk, except in case of folic acid where the reverse was the trend. These losses were least during pasteurization followed by microwave boiling, conventional boiling and in-bottle sterilization. AA

530

Nath (BS), Unnikrishnan (V), Gayathri (V), Chitra (PS), Preeja (CN), Murthy (MKR). **Organochlorine pesticide residues in animal tissues and their excretion through milk.** *Journal of Food Science and Technology (India)* 35(6); 1998; 547-548

Adipose tissue, liver and kidney samples of goats, sheep and oxen collected from the local slaughter house were found to contain BHC and DDT residues. Though the concn. of BHC were generally higher than those of DDT in milk samples of this area, DDT was in higher concn. in most of the tissues analyzed. Endosulphan was not detected in any of the samples. The cows maintained at the institute farm, consumed through their feed, about 500 µg of γ-BHC and 30 µg of total DDT/d and excreted about 80 µg of γ-BHC and 12 µg of total DDT/d through their milk. AA

531

Subbulakshmi (G) and Chitra (L). **Packaging of milk and milk products in India.** *Packaging India* 31(4); 1998; 37, 39, 43, 45-47



An overview of estimated market size for various milk products in the organised sector, indigenous dairy products and of packaging materials used in dairy industries are given. The products included are, liquid milk, conc. milks, milk powder, ice creams, butter, ghee, cheese, heat desiccated products, heat or acid coagulated products, fermented products, fat rich products, conc. products. SRA

532

Rysstad (G), Ebbesen (A) and Eggestad (J). **Sensory and chemical quality of UHT-milk stored in paperboard cartons with different oxygen and light barriers.** *Food Additives and Contaminants* 15(1); 1998; 112-122

The sensory and chemical shelf-life of UHT-milk stored at room temp. and at 6°C in Al-foil, non-foil barrier (X-board) and PE cartons were investigated. UHT milk in Al-foil stored in the dark has a min. shelf-life of 6 months, while the shelf-life is 4-5 months in X-board and PE cartons. When PE cartons and X-board cartons are stored with strong light exposure at 6°C, a development of light-induced off-flavour is detected after 2 and 8 wks., resp. The light-induced off-flavour effect is more pronounced than the effect of non-light induced oxidation of unsaturated lipids. AA

533

Upadhyay (KG). **Age thickening in sweetened condensed milk.** *Indian Dairyman* 50(10); 1998; 27-34

A review on age thickening (a major defect of sweetened condensed milk) is presented. The article indicates that the age thickening can be prevented and/ or minimized by taking into account the factors such as quality of raw milk, its composition, fat/SNF ratio of the rproduct, SNF-in-water ratio of the product, forewarning treatment, stage and method of adding sugar, addition of suitable stabilizing salt, stabilization through preliminary storage at below 20°C and storage at low temp. will ensure a stable fluidity. GS

## Milk products

534

Badrie (N), Gangapersad (S), Wickham (LD) and Donawa (A). **Production of pineapple flavoured fermented milk to suit Caribbean taste.** *Journal of*

*Food Science and Technology (India)* 35(6); 1998; 515-517

Fermented milk products were prepared from UHT-treated cow's milk, inoculated with 2% or 4% (v/v) active starter of *Lactobacillus bulgaricus* and incubated at 43°C for 3 h with or without the addition of pineapple. A pineapple flavoured fermented milk containing 8% (w/v) fruit and 5% (v/v) sucrose syrup was the most acceptable to Caribbean taste, having acquired the highest scores for all sensory attributes. This product was of satisfactory microbiological quality. On refrigerated storage at 4°C, the pH of the product decreased slightly, while lactic acid and viscosity increased. AA

535

Chopra (S). **Packaging of traditional milk products: A case for immediate attention.** *Packaging India* 31(4); 1998; 51-54

536

Jana (AH) and Upadhyay (KG). **Significant developments in the field of dairy products packaging.** *Packaging India* 31(4); 1998; 19-35

Characteristics of an ideal package, choice of an appropriate packaging material, need for newer packaging, economic significance, some widely used packaging materials (glass bottles, cans, plastic packaging, plastic forming technology, shrink-wrapping), packaging of milk and milk products (fluid milk, UHT milk, tetra pack, tetra brick, doypack system, bag-in-box system; butter, anhydrous milk fat, margarine and spreads, sweetened condensed milk, ice cream, yoghurt, cheese, soft cheeses, fresh cheeses; vacuum packaging, shrink packaging, sterilisable-flexible package; dried milks, indogenous dairy products), modified atm. packaging, oxygen scavengers, shelf-life, time-temp. indicators, micro-ovenable containers, edible films and coatings, growing packaging trends (simplicity of design and designer dairy packaging, better sealing technique, printing of information directly onto plastic packs, resource efficiency-reduction/light-weighting, elimination of migration of toxicants from the packaging material into the dairy product, environmental packaging considerations, biodegradable packaging materials, energy recovery and recycling of packaging materials) are the topics discussed in this paper. SRA



537

Agte (VA). **Effects of packaging on contamination and bio-availability of essential and toxic trace metals in dairy products.** *Packaging India* 31(4); 1998; 49-50

## Butter

538

Vaidya (PP), Thangaraj (M) and Jaiswal (PK). **Assessment of aflatoxin M<sub>1</sub> in selected butter samples in Nagpur city.** *Indian Dairyman* 50(9); 1998; 21-23

Nineteen samples of Table-butter and 17 samples of market white butter collected from Nagpur city, Maharashtra, India, were assessed. Samples analysed by AOAC method of 1984 did not show the presence of aflatoxin M<sub>1</sub>. The sensitivity of the test is 0.1 ppb. GS

## Channa whey

539

Kar (T) and Misra (AK). **Utilization of Channa whey for alcohol production.** *Indian Journal of Dairy Science* 51(3); 1998; 204-207

Attempts were made to utilize conc. deproteinized Channa whey (CW) for production of alcohol using *Kluyveromyces marxianus* subsp. *marxianus* NRRL Y-2415. Conc. CW containing 12.72% lactose produced 6.6% (v/v) alcohol conforming to the BIS specification, with complete utilization of lactose. Increase or decrease in the lactose concn. led to decline in the fermentation efficiency. Use of whey spirit for making alcoholic drinks and blending with neutral spirit is recommended. AA

## Cheese

540

Katsiari (MC), Voutsinas (LP), Alichanidis (E) and Roussis (IG). **Manufacture of kefalograviera cheese with less sodium by partial replacement of NaCl with KCl.** *Food Chemistry* 61(1/2); 1998; 63-70

Kefalograviera cheeses (KC five trials) of different Na content were made from split lots of curd by varying the salting processes, i.e. brine-and

dry-salting with NaCl (control) or a mixture of NaCl/KCl (3:1 or 1:1, w/w basis). The results indicated that up to 50% reduction of Na content in KC is feasible, with partial replacement of NaCl by KCl, without an adverse effect on its quality. It was also found that the cheeses made with the mixtures of NaCl/KCl did not exhibit any significant ( $P > 0.05$ ) difference in compositional (moisture, fat, protein, salt), physico-chemical (pH,  $a_w$ ), or textural (force and compression to fracture, hardness, cohesiveness, springiness, gumminess, chewiness) properties in comparison with the control cheese. KC of highly acceptable quality, which did not differ ( $P > 0.05$ ) in sensory characteristics (appearance, body and texture, flavour, total score) from the control cheese, can be produced using a mixture of NaCl and KCl instead of NaCl alone. The Na:K ratio (mol. basis) decreased from 35.3 in the control cheese to 4.2 and 1.4 in the cheeses salted with 3:1 or 1:1 mixture of NaCl/KCl, resp. The use of the 1:1 NaCl/KCl mixture in the salting of KC effectively brought its Na:K ratio close to the desired 1.0, while also greatly reducing the Na content by about 50%. AA

541

Sayer (G). **Packaging trends for cheese and other dairy products.** *Packaging India* 31(4); 1998; 55, 58, 59

542

Piraprez (G), Herent (M-F) and Collin (S). **Flavour retention by lipids measured in a fresh cheese matrix.** *Food Chemistry* 61(1/2); 1998; 119-125

Interactions between lipids and several aroma compounds (aldehydes, methylketones, esters, and dimethyldisulphide) were studied in a real food system composed of fresh cheese, triolein, and water. The concn. of 'free' ligands was measured with a dynamic headspace-gas chromatographic system. From the results, it was concluded that retention of all flavouring molecules increases with the amount of triolein. This phenomenon is highly influenced, however, by the structure of the aroma compound, as demonstrated by RP-HPLC lipophilicity detn. Within the same chemical family there exists a linear relationship between the lipophilicity index  $k_w$  and retention, indicating that this physicochemical property should be taken into account in choosing the best internal analytical standard. AA



Khamrui (K) and Goyal (GK). **Ripening of cheese in plastic films.** *Indian Dairyman* 50(9); 1998; 25-29

Indigenously available plastic film was examined and its suitability for ripening of cheddar cheese was compared with application of a coating of paraffin-wax. Cheddar cheese was vacuum packed in the selective plastic film (SPF P1). The other vacuum packed samples were shrink-wrapped (P2) by dipping in hot water (88°C). Paraffined cheese blocks served as control. The product P2 was most acceptable, followed by P1 and cheese blocks ripened in plastic film recorded lower pH (5.24 in P2 and 5.29 in P1) against in control. The lipolysis was higher in cheese samples packed and ripened in plastic film. It is revealed from the above study that SPF can be used for ripening of cheddar cheese beneficially without paraffin wax coating. GS

### Cheddar cheese

544

Khamrui (K) and Goyal (GK). **Biochemical and textural changes in vacuum packed accelerated ripened cheddar cheese during ripening.** *Indian Journal of Dairy Science* 51(3); 1998; 162-167

Cheddar cheese was manufactured using standard technique with slight modification for accelerated ripening. Blocks of green cheese were vacuum packed in plastic film (P<sub>1</sub>); vacuum packed in plastic film followed by shrink wrapping by dipping in hot water at 88°C for 5 sec (P<sub>2</sub>); and paraffined conventionally (control C). All the blocks were ripened at 10°C, and analysed for biochemical and textural changes at monthly intervals upto 3 months of storage. Max. titratable acidity development and lowest moisture loss was observed in P<sub>2</sub> followed by P<sub>1</sub> and control. Cheese blocks ripened in plastic film recorded low pH and higher proteolysis and lipolysis than that of paraffined control samples. Hardness, springiness, gumminess and chewiness decreased during ripening and these values were lowest in the samples packed in P<sub>2</sub> and lowest changes in control samples. Cohesiveness in cheese samples increased throughout ripening. Vacuum ripening of cheese under plastic film improved textural properties of cheese samples. AA

### Gouda Cheese

545

Kanawjia (SK) and Singh (S). **Effect of naturage on biochemical, textural and flavour attributes in Gouda cheese.** *Indian Journal of Dairy Science* 51(3); 1998; 188-195

The investigation was carried out to enhance flavour development in Gouda cheese manufactured by using Naturage enzyme (20 mg/l of milk). The cheese showed the balanced flavour with improved body and texture. The pH, soluble protein and FFA values were higher in experimental cheese than in control. The Instron textural studies revealed that hardness, springiness, gumminess and chewiness decreased during ripening, whereas cohesiveness increased. All textural attributes, except cohesiveness, were lower in experimental cheese as compared to control. BV

### Ghee

546

Panda (D) and Bindal (MP). **Detection of adulteration in ghee with animal body fat and vegetable oils using crystallization test.** *Indian Dairyman* 50(9); 1998; 13-16

Ghee samples (CS) prepared from pooled buffalo milk by direct cream method and clarified at 120°C, were used for crystallization test. GS were adulterated with animal body fats (cow, buffalo, pig), vegetable oils (cottonseed, groundnut, sunflower, soybean, mustard, coconut and dalda (hydrogenated vegetable fat), singly or in combination (5% animal body fat and 10% vegetable oil). Samples prepared from milk adulterated with animal body fats (crystallization time (CT): 4 to 12 min) and those of milk adulterated with vegetable oils ((CT) 23 to 27 min) were detected without any ambiguity. Ghee prepared from milk adulterated with hydrogenated vegetable fat (dalda) showed a much lower CT (15.5 min) and hence was fairly detected. GS

### Yoghurt

547

Nergiz (C) and Seckin (AK). **The losses of nutrients during the production of strained (Torba) yoghurt.** *Food Chemistry* 61(1/2); 1998; 13-16



A traditional method has been used in the production of Torba yoghurt (a strained yoghurt produced from cow's goat's or sheep's milk) and this is based on straining with a special cloth bag. In this study, the losses of nutrients during the straining of yoghurt were as follows: 51.8% thiamin, 60.5% riboflavin, 7.28% protein, 0.77% fat, 71.1% lactose, 70.2% Na, 68.2% K, 65.6% Ca and 50.2% P. Among the amino acids the least loss occurred in the amount of tyrosine (2.24%) and the loss of histidine was highest (11.4%). AA

548

Malik (RK), Rao (KVSS), Rao (KN), Sahai (D) and Mathur (BN)- **Yoghurt: Role of live microorganisms in human nutrition and health.** *Indian Dairyman* 50(9); 1998; 37-46

Aspects considered in this article include: yoghurt and yoghurt foods (definitions and specifications), nutritional and therapeutic aspects, antagonistic actions towards enteric pathogens in the intestines (lactose digestion and lactose intolerance, inhibitory action towards cancer, hypocholesteremic effects, significance of live microorganisms in various yoghurt products), yoghurt with selected bacteria, beneficial aspects of bio-yoghurt (hypocholesteremic effect of acidophilus milk, antimicrobial activity, anticarcinogenic activity) and regulation regarding requirements for live microorganisms in yoghurt and yoghurt products in other countries. BV

## Milk proteins

549

Ahmed (N), Grover (S), Pattnaik (P) and Batish (VK). **Genetic engineering of milk proteins for better manufacturing properties.** *Indian Dairyman* 50(10); 1998; 45-48

The chemical composition of milk particularly with respect to homologous and heterologous proteins can be improved through genetic engineering. Aspects considered include: milk genes and proteins, potential candidates for gene manipulation (caseins and lactoglobulins, whey proteins), casein engineering and gene manipulation for shelflife. Results of the study indicate that genetically modified milk proteins can improve the quality of dairy products and also the shelf-life and safety from public health point of view. BV

550

Metwalli (AAM) and Van Boekel (MAJS). **On the kinetics of heat-induced deamidation and breakdown of caseinate.** *Food Chemistry* 61(1/2); 1998; 53-61

Caseinate (dissolved in a milk salt sol.) was heated at temp. between 110 and 145°C for 0-120 min. Five different concn. of caseinate were studied ranging from 1-5% (w/w) sol. The heated sol. were analysed for ammonia and for non-protein N content (NPN). The increase in ammonia concn. was taken as a measure for deamidation of the protein. It was established that the order of the reaction with respect to concn. (the 'true' order) was 1, as determined from the dependence of deamidation on initial concn. of caseinate. The order with respect to time could not be clearly established as the extent of deamidation was not higher than some 30%. However, the order with respect to time tended towards 2 rather than 1, which may be an indication for inhibition of deamidation as the reaction proceeds. The temp. dependence of deamidation was characterized from the Eyring equation; the activation enthalpy was found to be 92 kJ mol<sup>-1</sup>, the activation entropy -70 J mol<sup>-1</sup> K<sup>-1</sup>. These results suggest a bimolecular reaction, in accordance with mechanisms of deamidation described in literature. The increase in NPN appeared to be much higher than that in ammonia. Ammonia (a part of the NPN fraction) amounted to only 10-15% of the NPN fraction. The NPN fraction increased considerably with heating intensity, for instance, to as high as 20% of total N (i.e. protein) after heating for 90 min at 140°C. This suggests considerable heat-induced protein breakdown resulting in small peptides and amino acids, or other low mol. wt. N-containing breakdown products. The order with respect to concn. tended towards 1, while the order with respect to time tended again towards 2. The activation enthalpy for NPN formation was found to be 107 kJ mol<sup>-1</sup> and the activation entropy -37 J mol<sup>-1</sup> K<sup>-1</sup>. AA

551

Yamamoto (Y) and Araki (M). **Effects of lecithin addition in oil or water phase on the stability of emulsions made with whey proteins.** *Bioscience, Biotechnology and Biochemistry* 61(11); 1997; 1791-1795

The effects of lecithin addition in oil or water phase on the stability of oil-in-water emulsions made with 0.1 wt.% whey protein and 10 wt.% n-tetradecane at neutral and acidic pH were studied by monitoring the



gravitational creaming and phase separation. The effects of lecithin addition on the interfacial behavior of  $\beta$ -lactoglobulin were also studied to compare with the results of emulsion stability. At neutral pH, crude phosphatidylcholine (PC) from egg yolk or soybean increased the stability of the emulsion made with protein and lowered the interfacial tension of protein films more effectively than pure egg PC. A more remarkable effect on both the emulsion stability and the interfacial tension was found when crude PC was added in the oil phase rather than in the water phase. The purity of lecithins and the way to add them are suggested to be very important to make a stable emulsion with protein. On acidic pH (4.5 or 3.0), the increased creaming or phase separation in a whey protein-stabilized emulsion, but the lowered interfacial tension of  $\beta$ -lactoglobulin films, were found upon the addition of pure or crude PC in oil or water phase. These results suggest that in acidic pH, densely packed films may be formed on a planar oil-water interface, but not on adsorbed layers around oil droplets in an emulsion. AA

## MEAT AND POULTRY

### Meat

552

Prochaska (JF), Ricke (SC) and Keeton (JT). **Meat fermentation research opportunities.** *Food Technology* 52(9); 1998; 52-56, 59

This article is intended to address current research trends concerning technological improvements and suggest future research areas for advancing meat fermentation and starter culture technology. Also offered for consideration is the incorporation of food-related additives that could enhance meat product nutritional value and quality. CSA

553

Miwa (M), Shibata (K), Nagayama (K) and Aikawa (K). **Nitric oxide formation by macrophages stimulated with water extracts from meats and offals.** *Bioscience, Biotechnology and Biochemistry* 61(11); 1997; 1953-1954

Water extracts from meats and offals were incubated with a macrophage cell line (RAW 264.7), and nitrite in the medium was measured as an index of the macrophage stimulating activity. Ten of 38 water extracts had macrophage stimulants and chicken meat, chicken gizzard, cattle reticulorumen, swine

stomach, and swine cerebrum had high activities. AA

554

Howells (LC) and Livesey (CT). **A survey of vitamin A concentrations in the liver of food-producing animals.** *Food Additives and Contaminants* 15(1); 1998; 10-18

### Mutton

### Sheep

### Lamb

555

Badiani (A), Nanni (N), Gatta (PP), Bitossi (F), Tolomelli (B), Manfredini (M). **Nutrient content and retention in selected roasted cuts from 3-month-old ram lambs.** *Food Chemistry* 61(1/2); 1998; 89-100

Values for proximate composition, cholesterol, 23 fatty acids, eight inorganic nutrients and six water-soluble vitamins were determined in the separable lean of paired raw and roasted rib-loins and legs from 10 carcasses of 3-month-old ram lambs. Cooking losses (both evaporative and drip) were much lower in rib-loin, which underwent a quicker heating than leg. The percentage apparent retention was calculated for each nutrient. In general, nutrients susceptible to loss through drippings during cooking, i.e. minerals and water soluble-vitamins, were better retained in rib-loin than in leg. The reverse was true for several polyunsaturated fatty acids, whose lower retention in rib-loin than in leg was probably due to the former's higher heating rate. The contribution of roasted lamb to the nutrient requirements of the consumer was noteworthy for oleic and linoleic acids, P, Zn and Fe, vitamin B<sub>12</sub>, niacin and riboflavin. AA

### Poultry

### Products

### Eggs

556

Pasin (G), Smith (GM) and O'Mahony (M). **Rapid determination of total cholesterol in egg yolk**



using commercial diagnostic cholesterol reagent. *Food Chemistry* 61(1/2); 1998; 255-259

A rapid and accurate method for cholesterol detn. using a commercial diagnostic cholesterol reagent ('enzyme method') was developed and evaluated with 4 different yolk preparations. The cholesterol content of The National Institute of Standards and Technology (NIST) Standard Reference Material in whole egg powder, fresh, frozen, and dried egg yolk was determined using GC and the enzyme method. All samples were subjected to direct saponification and solubilization prior to analysis. No treatment was applied to control samples, which were analyzed by the enzyme method. Solubilization of samples was performed at 0.85, 2 and 5% (w/v) NaCl concn. Solubilization measured in terms of cholesterol value was best at 2 and 5% NaCl levels. For egg powder standard and fresh or frozen egg, the cholesterol values obtained by the enzyme method from saponified or solubilized samples were not significantly different from values obtained by GC. For solubilized dried egg yolk the enzyme method gave results indistinguishable from chromatography for saponified yolk. However, the results obtained by the enzyme method and GC from saponified dried egg yolk were significantly different. The simple and rapid procedure developed for sample preparation (solubilization) eliminates the need for saponification prior to cholesterol detn. using the enzyme method, and provides an alternative to an expensive and time-consuming GC method. AA

## SEAFOODS

557

Decker (EA) and Xu (Z). **Minimizing rancidity in muscle foods.** *Food Technology* 52(10); 1998; 54-59

Preventing oxidative deterioration of muscle foods by minimizing the prooxidative effects of processing techniques, altering concn. of oxidation substrates and utilizing antioxidants is discussed. CSA

### Shrimp

558

Simpson (BK), Nayeri (G), Yaylayan (V) and Ashie (INA). **Enzymatic hydrolysis of shrimp meat.** *Food Chemistry* 61(1/2); 1998; 131-138

Fresh and frozen shrimp were hydrolyzed with chymotrypsin or trypsin, and their proximate composition, pH, amino acid content, and sensory properties were evaluated. The hydrolysates prepared with both enzymes had high levels of glycine, proline, arginine, and valine, and there were no significant differences in the sensory properties of the frozen and fresh products. The optimum conditions for aroma quality using chymotrypsin were obtained with an enzyme to substrate (E:S) ratio of 0.25-0.3% for 2.5 h at 35°C, while the optimum conditions with trypsin were 0.25-0.3% E:S ratio for 2.5-3.0 h at 40°C. Statistical analysis showed that second order polynomial models could be used to predict the content of specific amino acids to a reasonable degree of accuracy. AA

### Fish

#### Eel

559

Vishwanath (W), Lilabati (H) and Bijen (M). **Biochemical, nutritional and microbiological quality of fresh and smoked mud eel fish *Monopterus albus*: A comparative study.** *Food Chemistry* 61(1/2); 1998; 153-156

A comparative study of the biochemical, nutritional and microbiological quality of the fresh (FF) and smoked (SF) symbranchoid mud eel fish, *Monopterus albus* was carried out. SF had lower percentages of total protein (79.0 vs 76.0), pure protein (66.7 vs 57.1), lipid (10.74 vs 9.82) and ash (7.00 vs 6.00) contents than FF. The pH values of SF were more acidic than those of FF (6.90 vs 7.25). Digestibility and protein efficiency ratio (PER) were significantly less ( $P < 0.05$ ) in SF. Total plate counts of bacteria (TPC) and fungi (TFC) were  $10^6$ - $10^7$  g<sup>-1</sup> and  $10^2$  g<sup>-1</sup>, resp. in FF and  $10^9$ - $10^{10}$  g<sup>-1</sup> and  $10^5$  g<sup>-1</sup>, resp., in SF. *Salmonella* and *E. coli* were not present in any samples examined. However, coliform bacteria, *Staphylococcus aureus* and faecal *Streptococci* were detected in both. Seven genera of fungi were present in FF, the dominant one being *Fusarium* sp. Five genera of fungi were detected in SF, out of which *Penicillium* was dominant. AA

#### Hake

560

Pastoriza (L), Sampedro (G), Herrera (JJ) and Cabo (ML). **Influence of sodium chloride and modified**



atmosphere packaging on microbiological, chemical and sensorial properties in ice storage of slices of hake (*Merluccius merluccius*). *Food Chemistry* 61(1/2); 1998; 23-28

The effect of an optimum gas mixture (50% CO<sub>2</sub>:45% N<sub>2</sub>:5% O<sub>2</sub>) on hake slices (*Merluccius merluccius*) was studied when combined with a NaCl dip (5 min in 5% NaCl sol.). Exudation, water binding capacity (WBC), microbial growth, as well as undesirable chemical (pH, total volatile bases, lipid oxidation), and sensory alterations (raw fish odour, cooked fish flavour), were monitored. Values were compared with those obtained for air-stored samples and for MAP-stored samples in the absence of NaCl. NaCl dips showed a further inhibition of biochemical, microbiological and sensory deterioration of MAP-stored hake slices, so that total volatile bases and total viable counts values were significantly lower ( $P < 0.05$ ) than in fish stored under MAP conditions throughout all storage periods, and sensory properties were scored significantly higher. Exudation was also reduced in MAP-stored fish when previously dipped in NaCl sol. Consequently, the shelf-life of hake slices was extended for 2 days when stored under MAP conditions, and for 8 days if dipped in NaCl sol. prior to MAP storage. AA

## Products

### Fish

561

Hoshino (C), Tagawa (Y), Wada (S), Oh (J-H), Park (D-K), Nagao (A), Terao (J). **Antioxidant activity of quercetin against metmyoglobin-induced oxidation of fish oil-bile salt emulsion.** *Bioscience, Biotechnology and Biochemistry* 61(10); 1997; 1634-1640

The antioxidative effects of quercetin was examined in metmyoglobin-induced oxidation of a fish oil-bile salt emulsion (av. diam. of particles; 2.0  $\mu$ m) to evaluate its effectiveness during the digestion of highly oxidizable oils. The activity of quercetin increased with the lowering initial peroxide value (PV) of the oil and its effectiveness was superior to that of  $\alpha$ -tocopherol. A synergistic antioxidant effect was observed upon the addition of quercetin and  $\alpha$ -tocopherol irrespective of the initial PV of the oils, and quercetin was consumed faster than  $\alpha$ -tocopherol. The loss of quercetin was larger than that of  $\alpha$ -tocopherol when cumene hydroperoxide

and metmyoglobin were mixed in a trimyristic-bile salt emulsion. In an ultrafiltration experiment on emulsified oil with a membrane filter of 100 nm pore size, the recovery of quercetin in the filtrate was higher than that of  $\alpha$ -tocopherol. These data suggest that quercetin was an antioxidant in the digestion of fish oil. The effectiveness seems to come from its distribution in the emulsified oil, different from that of  $\alpha$ -tocopherol, and its ability to scavenge radicals generated from the reaction of lipid hydroperoxides with metmyoglobin. AA

## PROTEIN FOODS

562

Krishna Kumari (K) and Geervani (P). **Acceptability and shelf-life of low-cost, low-bulk supplementary food processed by popping.** *Andhra Agricultural Journal* 45(1/2); 1998; 68-73

A supplementary food PUSHTI for pre-school children was developed with puffed wheat, defatted soy flour and sugar in the ratio 7:1:2. The calorie density of PUSHTI at ready-to-feed semi-solid and dough consistency was 1.2 and 2.1 KCal/g of sol. PUSHTI in powder form was stored for 90 days in polyethylene bags and assessed for shelf-life. Popping of wheat and roasting of soy flour reduced the moisture level in the product, prevented infestation and thus increased the shelf-life of the product. PUSHTI in dough consistency was suitable to feed the children aged above 18 months, and to feed the children of 6 to 18 months, semi-solid form was suitable. GS

## ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

563

Urlaub (R). **Enzymes from genetically modified microorganisms and their use in the beverage industry.** *Food Australia* 50(8); 1998; 390-393

Enzymes in fruit processing, pectinases from genetically modified microorganisms, commercial case studies and European legal aspects are discussed. SRA



## Beer

564

Linssen (JPH), Rijnen (L), Legger-Huijsman (A) and Roozen (JP). **Combined GC and sniffing port analysis of volatile compounds in rubber rings mounted on beer bottles.** *Food Additives and Contaminants* 15(1); 1998; 79-83

Two types (A and B) of rubber rings used on clasps of swing top beer bottles, were investigated for the presence of volatile compounds, which could affect the taste/odour of the packed beer due to (vapour phase) migration. Samples were incubated under different conditions and, after dynamic headspace sampling analysed by combined GC and sniffing port analysis compounds were also identified by GC-MS. Risk for off-flavour development is expected to be diminished by using ring type B. The main differences were located in the presence of isobutene isomers in ring type A, which were absent in ring type B. GS

565

Carvell (JP), Harding (CL) and Oddi (L). **Laboratory yeast analyser for off-line measurement of viable yeast concentrations in brewing.** *Food Australia* 50(8); 1998; 389

This article describes the capacitance method for the measurement of viable cell concn. using the "off-line" instrument, and compares results with those obtained with a flow cytometer and a haemocytometer. All 3 methods yielded a linear relationship between estimated and measured values. The correlation coeff. for the Aber model 800 was 0.9998; for the haemocytometer, 0.0409 and for the Aber flow cytometer, 0.9990. These results showed that both the lab yeast analyser (LYA) and microcyte flow cytometer (MFC) methods provided significantly better correlation than the haemocytometry method. The measurement as a % of estimated viability, for both the LYA and MFC, was consistent over the viability range of 95% to 8%, varying between plus or minus 1.2% and plus or minus 2.2%, and plus or minus 1.5% and plus or minus 2.3%, resp. Haemocytometry, exhibited errors in the range of plus or minus 6.7% (at 95% viability) to plus or minus 28.4% (at viability of 8%). SRA

566

Macedo (RF), Soccol (CR) and Freitas (RJS). **Production of low-cost beverage with soy milk, buffalo cheese whey and cow milk fermented by *Lactobacillus casei* Shirota and *Bifidobacterium adolescentis*.** *Journal of Scientific and Industrial Research* 57(10,11); 1998; 679-685

Cheese whey and soy milk are interesting substrates for the production of fermented milk beverages because they can substitute partially or totally the cow's milk, reducing the final cost of the product. In addition, the use of intestinal species of bacteria such as *Lactobacillus* and bifidobacteria is attractive due to the potential health-promoting effects associated with these species. The report of fermentation of substrate composed of buffalo cheese whey, soy milk and skimmed cow milk by a combination of strains of *Lactobacillus* and bifidobacteria is presented. Acid development, pH, carbohydrate consumption and viable cells count are followed during the fermentation carried out at 37°C for 8 to 12 h. In order to reduce the amount of cow milk, the use of different proportions of the substrates that varied from 30-40% of the total content is reported. The time to obtain the higher number of viable cells in the inoculum is studied and the largest number was obtained within 48 and 60 h for *Lactobacillus* and bifidobacteria, resp. Heat treatment conditions are tested using temp. from 75 - 95°C to and durations from 5 to 30 min. The best results are obtained with the use of the co-culture *Lactobacillus casei* ssp. Shirota and *Bifidobacterium adolescentis*, resulting in a product having better taste and flavour. AA

## Coffee

567

Wohrmann (R), Averbeck (M) and Maier (HG). **Volatile minor acids in coffee: III. Contents in chicory roots and barley malt.** *Deutsche Lebensmittel-Rundschau* 93(9); 1997; 285-286

The content of 21 volatile monocarboxylic acids (from propanoic to pentadecanoic acid and some butenoic acids) have been determined in chicory roots and barley malt, dried and roasted each, by means of SDE and GC/FID. Identified and quantified for the first time in green coffee are 12 acids each in dried chicory, dried malt and roasted



chicory, 14 acids in roasted malt were identified and 16 were quantified for the first time. The contents are lower than the literature values. Most of the contents increase during roasting, but not these of the most prevailing acids (tetradecanoic, pentadecanoic and hexanoic acids). AA

### Fruit juices

568

Patz (C-D), Galensa (R) and Dietrich (H). **Sulphite determination in juices using HPLC- enzyme-reactor-coupling.** *Deutsche Lebensmittel-Rundschau* 93(11); 1997; 347-351 (De)

569

Koniger (M), Ziegler (W) and Wallnofer (PR). **Determination of thiabendazole transferred to hands during juice production.** *Deutsche Lebensmittel-Rundschau* 93(12); 1997; 378-380 (De)

### Apple juice

570

Ceci (L) and Lozano (J). **Determination of enzymatic activities of commercial pectinases for the clarification of apple juice.** *Food Chemistry* 61(1/2); 1998; 237-241

Different methods for testing polygalacturonase (PG), pectinesterase (PE), and pectinlyase (PL) activities were applied to Rohapect D5S (RHD5) and Pectinol (PA1) commercial enzyme preparations in an apple pectin substrate. The viscometric method for PG activity detn. was satisfactory, but foreign proteins could affect the spectrophotometric detn. of PL activity in sol. of enzyme preparations. Although 50°C was a well-defined breaking point where enzymes rapidly decrease their activity, rate and range of heat-inactivation were different depending on the activity assayed. While PG activity showed 2 periods of different thermolability, PL was monophasic and highly sensitive to heat. The pH dependence of the pectic enzyme activities was also studied over the 3-7 range. AA

571

Belton (PS), Colquhoun (IJ), Kemsley (EK), Delgadillo (I), Roma (P), Dennis (MJ), Sharman (M), Holmes (E), Nicholson (JK), Spraul (M). **Application of chemometrics to the <sup>1</sup>H NMR spectra of apple**

**juices: Discrimination between apple varieties.** *Food Chemistry* 61(1/2); 1998; 207-213

Discrimination between apple juices produced from different var. (Spartan, Bramley, Russet) has been achieved by applying principal components analysis (PCA) and linear discriminant analysis to <sup>1</sup>H NMR spectra of the juices. The use of covariance and correlation matrix PCA methods was investigated and different regions of the spectrum were analysed in view of the large range of signal intensities. All the methods gave a high success rate of classification, with at least 24 out of 26 samples being correctly assigned when five principal components were used. Under optimum conditions a 100% success rate was achieved. Examination of the principal component loadings showed that the levels of malic acid and sucrose were 2 important chemical variables, but variations in the composition of the minor constituents were also found to make a significant contribution to the discrimination. AA

### Citrus juice

572

Canovas (M), Garcia-Cases (L) and Iborra (JL). **Shifts in metabolism and morphology of *Rhodococcus fascians* when debittering synthetic citrus juices in the absence of aeration.** *Biotechnology Letters* 19(12); 1997; 1181-1184

*Rhodococcus fascians* showed two different morphologies, coccoid pink (CP) and ovoid white (OW), with different growth kinetics and limonin consumption on citrus synthetic juices (45 mg limonin/l) under non-aerating conditions. In separate experiments, the CP form reached nearly 90% of limonin consumption on citrus synthetic juices at pH 4.0 and absence of aeration whereas the OW form only 50% under the same conditions. Under anaerobic conditions the CP form was transformed to the OW form within 48 h, its limonin consumption being reduced up to 50% after 144 h fermentation. AA

### Kinnow juice

573

Premi (BR), Joshi (VK) and Lal (BB). **Physico-chemical and sensory qualities of kinnow juice debittered by immobilized cells of *Arthrobacter globiformis* II.** *Journal of Scientific and Industrial Research* 57(10,11); 1998; 698-702



Evaluation of the immobilized *Arthrobacter globiformis* II in debittering kinnow juice is described. It is observed that the limonin content is reduced significantly, whereas there is no change in naringin content of the treated juice. The optimum reduction of limonin by this treatment is achieved between 4th to 15th day of immobilization with a retention time of 4 h. The treatment has no effect on juice quality, except for a small change in titratable acidity and pH of the juice. sensory evaluation reveals improvement in the taste and extent of debitterness of the treated juice, apparently due to the removal of bitter principle limonin, without affecting the sensory scores awarded to other quality parameters. However, some off-flavour of immobilization gel material (sodium alginate) gets incorporated into the juice. AA

### Mango juice

574

Chauhan (SK), Lal (BB) and Joshi (VK). **Development of a protein-rich mango beverage.** *Journal of Food Science and Technology (India)* 35(6); 1998; 521-523

A protein-rich mango beverage was prepared by blending mango pulp with soy protein isolate in different proportions [(100:00, T<sub>1</sub>), (90:10, T<sub>2</sub>), (80:20, T<sub>3</sub>), (70:30, T<sub>4</sub>), (60:40, T<sub>5</sub>), (50:50, T<sub>6</sub>), (40:60, T<sub>7</sub>), (30:70, T<sub>8</sub>), (20:80, T<sub>9</sub>) and (10:90, T<sub>10</sub>)]. The products were analysed for physico-chemical and sensory characteristics. As the ratio of protein isolate to the mango pulp increased, the acidity, reducing sugars, ash, flow time, fibres increased, while pH values decreased. The beverage consisting of 60% mango pulp and 40% protein isolate with TSS of 16.00 °B, 0.42 acidity, 6.80% proteins, 0.67% fat content and a sensory score of 92.0 was found to be the best. The product had substantially higher protein and fat contents than those of control (T<sub>1</sub>) with good flavour, taste, body and overall quality. The best product showed six months storability without any changes in constituents. AA

### Orange juice

575

Tonder (D), Petersen (MA), Poll (L) and Olsen (CE). **Discrimination between freshly made and stored reconstituted orange juice using GC odour**

**profiling and aroma values.** *Food Chemistry* 61(1/2); 1998; 223-229

The aroma of freshly made and stored reconstituted orange juice was analyzed by GC-MS and GC-FID. The importance of the individual compounds was evaluated by calculation of aroma values. For comparison, the same samples were evaluated by a GC-sniffing technique called GC Odour Profiling, using a panel of 5 assessors. Both methods showed that there were significant differences between freshly made and stored juice, but the 2 methods did not always show the same compounds/odours to be important. On the other hand, many similarities were seen, as ethyl butanoate,  $\beta$ -pinene, limonene, octanal and linalool were shown to be important by both methods. In conclusion, both methods proved to be useful for identifying important aroma compounds in orange juice and for discrimination between fresh and stored juice. AA

### Soft drinks

576

Gentile (T). **Soft drinks standards review-an industry perspective.** *Food Australia* 50(8); 1998; 378

Review covers caffeine and soft drinks - science must prevail, date marking-continuing soft drink exemption sought, hygiene regulations, taxation reform - an important issue for soft drinks. SRA

### Tea

577

Miyagawa (C), Wu (C), Kennedy (DO), Nakatani (T), Ohtani (K), Sakanaka (S), Kim (M), Matsui-Yuasa (I). **Protective effect of green tea extract and tea polyphenols against the cytotoxicity of 1,4-naphthoquinone in isolated rat hepatocytes.** *Bioscience, Biotechnology and Biochemistry* 61(11); 1997; 1901-1905

The cytoprotective effect of green tea extract and its phenolic compounds against 1,4-naphthoquinone-induced hepatotoxicity was evaluated in primary cultured rat hepatocytes. After exposure to 1,4-naphthoquinone, lactate dehydrogenase (LDH) leakage and cell viability were both improved by the presence of the tea extract and tea polyphenols. This cytoprotective effect was related to the structure of



tea polyphenols, the galloyl group of (-)-epigallocatechin-3-gallate and (-)-epicatechin-3-gallate being particularly effective. The production of lipid peroxidation by 1,4-naphthoquinone was not inhibited by the tea extract nor by tea polyphenol addition. After 2 h of incubation, the protein thiol concn. was reduced by 1,4-naphthoquinone, but this reduction was prevented by the tea extract and tea polyphenols. The reduction in protein thiol content of the cells closely paralleled the LDH leakage and loss of cell viability. Results suggest that the mechanism of protection by tea polyphenols against 1,4-naphthoquinone-induced toxicity to rat hepatocytes was due to the maintenance of protein thiol levels. AA

578

Copeland (EL), Clifford (MN) and Williams (CM). **Preparation of (-)-epigallocatechin gallate from commercial green tea by caffeine precipitation and solvent partition.** *Food Chemistry* 61(1/2); 1998; 81-87

A method has been developed which enables the easy and inexpensive preparation of gram quantities of (-)-epigallocatechin gallate from green tea (*Camellia sinensis*). A decaffeinated aqueous brew of commercial green tea is treated with caffeine (30 mM). The precipitate is redissolved after decaffeination with chloroform and further purified by solvent partition with ethyl hexanoate and propyl acetate. Commercial leaf (25 g) yields 400 mg (-)-epigallocatechin gallate at better than 80% purity, as judged by RP-HPLC. AA

## FATS AND OILS

579

Song (J-H), Inoue (Y) and Miyazawa (T). **Oxidative stability of docosahexaenoic acid-containing oils in the form of phospholipids, triacylglycerols, and ethyl esters.** *Bioscience, Biotechnology and Biochemistry* 61(12); 1997; 2085-2088

The peroxidative stability of docosahexaenoic acid (DHA)-containing oils (DHA at 10.7 mol.% of the total fatty acids), in the form of phospholipids (PL), triacylglycerols (TG), and ethyl esters (EE) with the same constituent fatty acids, was investigated in the dark at 25°C in a bulk phase, and compared with that of control palm oil (supplemented with 20% soybean

oil). The oxygen absorption of the DHA-containing oil was significantly lower in the form of PL than in the form of TG and EE during a 10-wk. oxidation, and the oxygen absorption of PL was almost equivalent to that of the control oil. A gas chromatographic analysis showed that 90% of initial DHA was retained in the form of PL after the 10-wk. oxidation, while TG and EE resp. more rapidly decayed with the loss of 97% and 64% of DHA. Tocopherol in the form of TG and EE had also completely decayed after the oxidation, while 37% of the initial tocopherol remained in the form of PL. The peroxide and carbonyl values of TG and EE showed large DHA-containing oil in the form of PL was more resistant to the oxidative degradation of DHA than that in the form of TG and EE in a bulk phase. AA

580

McClements (DJ) and Demetriades (K). **An integrated approach to the development of reduced-fat food emulsions.** *CRC Critical Reviews in Food Science and Nutrition* 38(6); 1998; 511-536

This article covers, fat replacers, emulsion characteristics (definitions, emulsion stability), shelf-life (influence of fat droplets on shelf-life, impact on shelf-life of reduced fat products), texture (influence of fat droplets on texture, impact on texture of reduced fat products), appearance (influence of fat droplets on appearance, impact on appearance of reduced fat products), flavour (influence of fat droplets on flavour, impact on flavour of reduced-fat products), and integrated approach to development of reduced-fat emulsions. 26 references. SRA

581

Marangoni (AG) and Hartel (RW). **Visualization and structural analysis of fat crystal networks.** *Food Technology* 52(9); 1998; 46-51

Novel microscopic and rheological techniques in combination with fractal analysis aid in studying the structure of fat crystal networks and predicting their functional properties. CSA

## Oils

582

Premavalli (KS), Madhura (CV) and Arya (SS). **Storage and thermal stability of refined**



**cottonseed oil-mustard oil blend.** *Journal of Food Science and Technology (India)* 35(6); 1998; 530-532

Storage and thermal stability of refined cottonseed oil-mustard oil blend was studied. The oil blend remained stable upto 12 months at ambient conditions despite very slow rate of oxidative reaction. The frying changes in oil blend as well as mustard oil as control was studied by continuous frying of pooris upto 18 h, with the replenishment of oil blend after every 6 h of frying. Considering the overall changes in quality parameters and the polar compounds under the mode of frying operations, the thermal stability of oil blend was lower than mustard oil only. AA

583

Yadava (TP), Friedt (DW) and Gupta (SK).. **Oil content and fatty acid composition of taramira (*Eruca sativa* L.) genotypes.** *Journal of Food Science and Technology (India)* 35(6); 1998; 557-558

One hundred genotypes of taramira (*Eruca sativa* L.) were evaluated for oil content and fatty acid composition. The oil content ranged from 31.86 to 41.32%. The study revealed large variations in erucic acid (26.7-52.4%), oleic acid (14.1 to 23.4%), linoleic acid (6.9 to 15.7%), linolenic acid (8.3 to 15.3%) and eicosenoic acid (9.3 to 18.3%). One genotype was identified with low erucic acid (26.7%), which could help in improving the oil quality of taramira. The significant negative correlations of erucic acid with that of oleic acid ( $r = -0.7096$ ), linoleic acid ( $r = -0.5102$ ) and linolenic acid ( $r = -0.6010$ ) and significant positive correlation of oleic acid with linoleic acid ( $r = 0.2397$ ) were obtained. AA

584

Panda (D) and Bindal (MP). **Detection of adulteration of vegetable oils and hydrogenated oil with animal body fats by opacity test.** *Journal of Food Science and Technology (India)* 35(6); 1998; 549-550

A simple method based on opacity of oils/fats was developed to detect the adulteration of vegetable oils with animal body fats. The time required to acquire optical density (OD) of 0.14-0.16 at 570 nm on keeping the oil sample at 12°C formed the criteria for

the detection of such adulteration. This can be well adopted as platform test. AA

## Palm oil

585

Knezevic (ZD), Siler-Marinkovic (SS) and Mojovic (LV). **Kinetics of lipase-catalysed hydrolysis of palm oil in lecithin/isooctane reversed micelles.** *Applied Microbiology and Biotechnology* 49(3); 1998; 267-271

Reports the use of *Candida rugosa* lipase on the hydrolysis of palm oil in a lecithin/isooctane reversed micellar system. The reaction obeys Michaelis-Menten kinetics for the initial conditions. Kinetic parameters such as max. rate and Michaelis constant ( $K_m$ ) were determined for lipase-catalyzed hydrolysis in n-hexane and isooctane. According to the  $K_m$  values, the enzyme affinity towards the substrate was increased in isooctane. The max. degree of hydrolysis was generally decreased as the initial substrate concn. was increased. This suggest that the hydrolysis in lecithin reversed micelles should be regarded as a one-substrate first-order reversible reaction. This study shows that the proposed one-substrate first-order kinetic model can serve for the precise prediction of the degree of hydrolysis for a known reaction time or vice versa, when the initial substrate concn. is  $< 0.325 \text{ mol/dm}^3$ . A disagreement with this model was found when the initial substrate concn. was higher than approx.  $0.3 \text{ mol/dm}^3$ . This may be due to the effects of the products on lipase activity or even to the conversion of the reversed micellar system to other systems. AA

## Rice bran oil

586

Tikkoo (AK), Agarwal (YC) and Gupta (DK). **Status of rice bran oil in India.** *Indian Food Industry* 17(4); 1998; 207-214

The article reports the production of edible rice bran oil which has been consistently increasing to a level representing about 60% of the total oil yield. The trend of the parameters could be mathematically analysed through regression yielding appropriate models. However, the solvent extraction industry is processing only 50% of the total bran produced, mainly because, huller bran is not available to the industry. Possible strategies for further improvement



through involvement of industry and government have been suggested. CSA

## SPICES AND CONDIMENTS

### Spices

#### Ginger

587

Chandrappa (N), Melanta (KR) and Venkatesha (J). **Effects of methods of storage on the viability of seed rhizomes in ginger (*Zingiber officinale* Rosc.).** *Indian Cocoa, Arecanut and Spices Journal* 21(3); 1997; 68-69

#### Pepper

588

Gonzalez-Castro (MJ), Oruna-Concha (MJ), Lopez-Hernandez (J) and Simal-Lozano (J). **Effects of freezing and freeze-drying on the fatty acid contents of Padron type peppers.** *Deutsche Lebensmittel-Rundschau* 93(12); 1997; 390-392 (De)

GC-FID was used to monitor changes over time in the palmitic, stearic, arachidic, oleic, linoleic and linolenic acid contents of Padron type peppers subjected to various preservation treatments. In peppers stored in polyethylene bags at -22°C, all fatty acid contents dropped appreciably within the first month of storage, regardless of whether the peppers had been hand- or vacuum-packed. In peppers which had been freeze-dried then stored at room temp. in an airtight container, polyunsaturated fatty acid contents dropped appreciably only after 2 months. AA

## SENSORY EVALUATION

589

Stone (H) and Sidel (JL). **Quantitative descriptive analysis: Developments, applications and the future.** *Food Technology* 52(8); 1998; 48-52

Discusses how the quantitative descriptive analysis methodology - a means for quantifying perception was developed and refined and what lies ahead. CSA

590

Mennella (JA). **Visions of the future in basic chemosensation research.** *Food Technology* 52(8); 1998; 58-59, 61

Biology and psychophysics of taste, biology and psychology of olfaction, physiology of flavour and flavour preferences are the aspects highlighted in this article. CSA

591

Ni (H) and Gunasekaran (S). **Food quality prediction with neural networks.** *Food Technology* 52(10); 1998; 60-65

Discusses that a three-layer artificial neural network is able to predict more accurately than regression equations the rheological properties of Swiss-type cheeses on the basis of their composition. CSA

592

Szczesniak (AS). **Sensory texture profiling: Historical and scientific perspective.** *Food Technology* 52(8); 1998; 54-57

Influence of flavour profiling, aspects unique to texture and development of texture profiling are the aspects discussed in this article. CSA

593

Bomio (M). **Neural networks and the future of sensory evaluation.** *Food Technology* 52(8); 1998; 62-63

Discusses that the interface of sensory evaluation and product development depends on the inductive methods of neural networks and fuzzy logic. CSA

## FOOD STORAGE

Nil



594

Khandelwal (GD) and Wedzicha (BL). **Reaction of dichlorovos, dichloroacetaldehyde and related compounds with nucleophiles and phenols.** *Food Chemistry* 61(1/2); 1998; 191-200

Model compounds are used to demonstrate functional group reactivity of dimethyl-2,2-dichlorovinyl phosphate (DDVP, Dichlorvos or Vapona) towards amino compounds, phenols and thiols. Methylation of thiols occurs as a result of a trans-methylation reaction by DDVP. In aqueous media, the dichlorovinyl portion of the DDVP molecule is converted predominantly to dichloroacetaldehyde (DCA), in the absence of added nucleophile. The reactions of DCA with thiols, amino acid, and phenols are reported and mechanisms are suggested. 1,1-Dichloroacetone and methyl dichloroacetate were also used as model compounds to provide a greater insight into the reactivity of the dichloro-moiety of DDVP and DCA. AA

## BIOCHEMISTRY AND NUTRITION

595

Rodriguez-Palmero (M), Castellote-Bargallo (AI), Lopez-Sabater (C) and de la Torre-Boronat (C). **Assessment of dietary nutrient intakes: Analysed vs calculated values.** *Food Chemistry* 61(1/2); 1998; 215-221

In this study the nutrient composition of the diet of a nursing home calculated from food composition tables with that obtained from laboratory analysis of cooked mixed dishes was compared. A total of 43 food samples were analysed. Analysed parameters comprised fat, fatty acids, cholesterol,  $\alpha$ -tocopherol and eight minerals. It was found that calculated values were a good estimation of energy, fat, polyunsaturated fatty acids (PUFA), cholesterol, K and P intakes. In contrast, other parameters showed differences between calculated and analysed values, which ranged from 11% for Mg intake to 56% for Na intake ( $P < 0.05$ ). Values obtained from tables tended to underestimate saturated fatty acids, monounsaturated fatty acids, Ca, Mg and Na intakes, and overestimate  $\alpha$ -tocopherol and Fe

596

Meyer (AS), Heinonen (M) and Frankel (EN). **Antioxidant interactions of catechin, cyanidin, caffeic acid, quercetin, and ellagic acid on human LDL oxidation.** *Food Chemistry* 61(1/2); 1998; 71-75

Flavonoids and phenolic acids are currently believed to exert cardioprotective effects in humans via their ability to inhibit oxidation of low-density lipoprotein (LDL). The influence of chemical structure on antioxidant activity of catechin, quercetin, cyanidin, caffeic acid, and ellagic acid was evaluated by measuring inhibition of Cu-catalysed human LDL oxidation *in vitro*. The 5 plant phenols investigated all possess a similar O-dihydroxy moiety. The order of antioxidant activity was catechin > cyanidin approx. equal to caffeic acid > quercetin > ellagic acid. The observed differences in activities are discussed in terms of structural dissimilarities of the compounds. Potential synergistic or antagonistic effects between catechin, cyanidin, caffeic acid, quercetin, and ellagic acid were investigated by measuring the antioxidant activities on LDL of 20 different combinations of 2/3 of these phenols. All the antioxidant effects were additive except for combinations including ellagic acid with catechin, where ellagic acid exerted a significant antagonistic effect. It is proposed that the mechanism behind this antagonistic interaction is due to hydrogen bonding between carbonyls in ellagic acid and O-dihydroxyl groups in catechin. AA

597

Mulvihill (B) and Morrissey (PA). **Influence of the sulphhydryl content of animal proteins on *in vitro* bioavailability of non-haem iron.** *Food Chemistry* 61(1/2); 1998; 1-7

Meat is a known enhancer of non-haem Fe bioavailability from foods. The exact mechanism by which this enhancement occurs remains unknown. This present study was designed to identify the 'meat factor'. The ability of different animal proteins to reduce non-haem Fe(III) to Fe(II) during an *in vitro* digestion was determined. The role of the -SH content of the proteins was also evaluated. When compared to egg albumin, meats from different sp. significantly enhanced dialysable ionic Fe, D-(Fe(II) + Fe(III)), and dialysable Fe(II), D-Fe(II), ( $P < 0.05$ ).



In contrast, whey protein was inhibitory. Statistically significant linear correlations were established between the -SH content of the systems and their ability to reduce Fe(III) ( $r^2$  0.451,  $P < 0.02$ ) and dialyse the Fe(II) formed ( $r^2$  0.524,  $P < 0.01$ ). Incorporation of the -SH blocking agent, N-ethylmaleimide, significantly inhibited Fe(III) reduction and Fe(II) dialysability in a dose-related manner. These results suggest that the -SH content of animal proteins plays an important role in enhancing non-haem Fe bioavailability and hence, may be related to the 'meat factor'. AA

598

Chung (K-T), Wong (TY), Wei (C-I), Huang (Y-W) and Lin (Y). **Tannins and human health: A review.** *CRC Critical Reviews in Food Science and Nutrition* 38(6); 1998; 421-464

This article reviews the effects of naturally occurring tannins on human health, with emphases on their association with antinutritional, carcinogenic, anticarcinogenic, antimutagenic and antimicrobial activity. Antimicrobial properties and potential applications of tannins in food processing are also discussed. Tannins as anticarcinogenic activity, tannins showing antimutagenic activity, filamentous fungi, yeast, bacteria and viruses susceptible to the toxic effect of tannins are tabulated. Effects of tannins on microbial enzyme activities, other biological effects and applications of tannins, and research perspective are also included in the topic. 311 references. SRA

599

Feldheim (W), Fischer (K) and Wisker (E). **In vitro method for estimation of calcium availability.** *Deutsche Lebensmittel-Rundschau* 93(12); 1997; 381-383 (De)

## TOXICOLOGY

600

Burchat (CS), Ripley (BD), Leishman (PD), Ritcey (GM), Kakuda (Y), Stephenson (GR). **The distribution of nine pesticides between the juice and pulp of carrots and tomatoes after home processing.** *Food Additives and Contaminants* 15(1); 1998; 61-71

The distribution of 9 pesticides between the juice and pulp of carrots and tomatoes during home culinary practices was investigated. Tomato and carrot pulp contained a higher percentage of all pesticide residues, except for mancozeb in tomatoes. Although there was a difference in the relative distribution of the pesticides between the commodities with greater amounts present in the pulp of tomatoes, the pesticides followed a similar trend in both. A relationship between the pulp/juice distribution and water solubility of the pesticide was apparent. Pesticides with the highest water solubility were present to a greater extent in the juice. An exception was noted in the case of diazinon and parathion, which were present in higher amounts in the pulp than their water solubility would suggest. The percent residue in the pulp ranged from 56.4 to 75.2% for carrots, and 49.7 to 95.4% for tomatoes. Residues in the juice prepared from washed commodities ranged from not detected to 0.83 µg/g. Washing of the produce removed more residue from carrots than from tomatoes, but it did not affect the relative distribution of the residues. The behaviour and fate of the chemical varied with the pesticide as well as the crop. AA

601

Setia (K), Kawatra (BL), Hira (CK) and Mann (SK). **Toxic heavy metal contents of food materials consumed by the population in tubewell and sewage water irrigated areas.** *Journal of Food Science and Technology (India)* 35(6); 1998; 543-546

The various food crops grown in sewage water irrigated area had higher concn. of lead, cadmium and nickel than those grown on tubewell water irrigated soils. Green leafy vegetables had the highest concn. of these toxic heavy metals. The heavy metal contents in cooked foods, milk and water consumed by low and middle income group families in sewage irrigated area were also more as compared to the samples from the tubewell water irrigated area. AA

## FOOD LAWS AND REGULATIONS

602

Kirschman (JC). **Effective regulatory approval process for food ingredient technologies.** *CRC Critical Reviews in Food Science and Nutrition* 38(6); 1998; 465-510



This review discusses changes and lessons learned in food safety sciences over the last 4 decades. Routes to approval for market introduction, FEMA GRAS, changes in science since 1958 (chemistry, agricultural practices and food technologies, toxicology and safety evaluation, changing perspectives, impact of the Delaney clause and De minimis structure/activity relationship, changes in time and dollar costs, changing prominence of FDA in food safety and toxicology, estimating human exposure, changes in safety factors over the yrs., threshold of regulation, macronutrient substitutes, FDA operations, case studies (FD and C colours), all FD and C colours (hyperkinensis), FD and C red No.2 (amaranth), FD and C red No. 3 (erythrosine), decaffeination solvents-TCE and DCM, TCE (trichloroethylene), DCM (dichloromethane, methylene chloride), food additive functional categories in the U.S., routes by which plant toxins can enter the food chain, major scientific landmarks of the last 3 decades that are relevant to toxicology, FEMA GRAS, report of the past presidents of the society of toxicology, FDA's Red Book: toxicological principles for safety assessment of direct food additives and colour additives used in food aspects are covered in the topic. Many references. SRA

603

Matzke (U). **Novel-food-regulation and labelling provisions: Cheating peak or one step to clarify the problem.** *Deutsche Lebensmittel-Rundschau* 93(11); 1997; 352-359 (De)

There is no way to stop genetic engineering methods in the food industry. In view of the inherent potential risks posed by genetic modifications the regulations for the control of nutrients are not adequate for the problems of novel food and food ingredients. For this reason, a scientific assessment based upon analysis of existing data has to examine the characteristic ingredients in comparison with conventional foodstuffs and must be distinguishable through appropriate labelling. A number of other features (e.g. pharmaceuticals, eggs lacking in cholesterol, bioactive additives, ethical objections to specific substances e.g. fish genes in strawberries and allergenic substances) must be labelled with regard to purity and potential impact on health. The object in view is to remove trade barriers arising from different national regimes and to ensure consumer protection by imposing uniform authorization requirements and labelling provisions without cheating. AA

604

Jomlinson (N). **The EC novel foods regulation: A UK perspective.** *Food Additives and Contaminants* 15(1); 1998; 1-9

To ensure that all the member states of the European Union, follow a consistant approach to the safety assessment of novel foods, the commission has published a series of guidelines to accompany the regulation. GS



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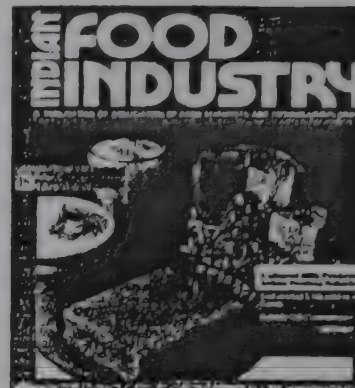
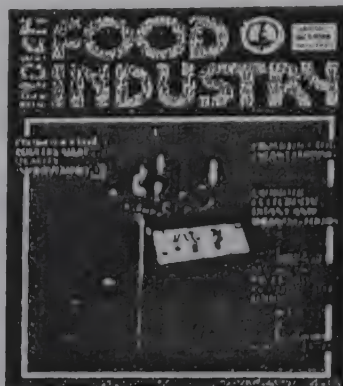
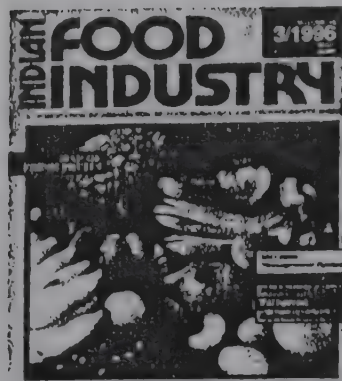


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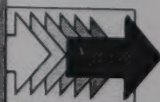
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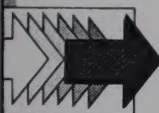
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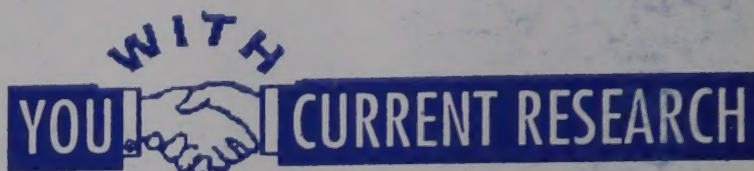
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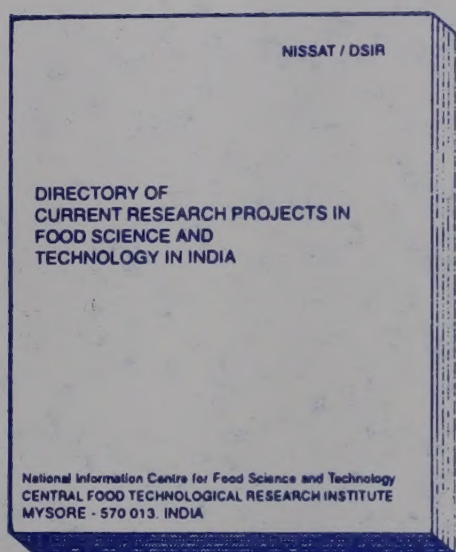
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